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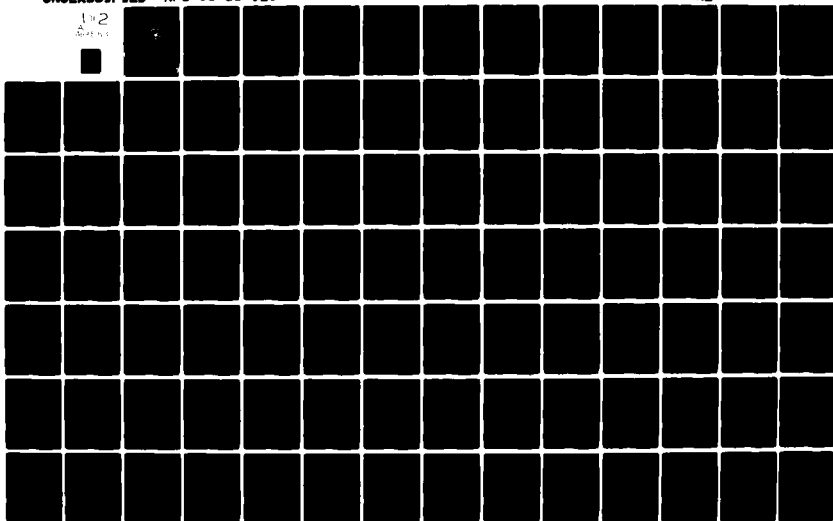
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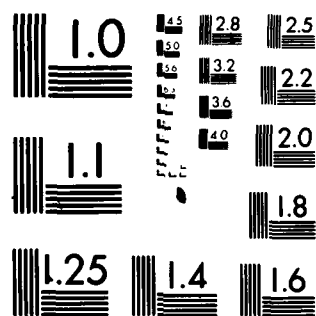
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Monterey, California



INDIGENOUS ADVANCED FIGHTER AIRCRAFT IN ISRAEL:
CONSIDERATIONS FOR DECISION-MAKING

by

Ran Goren

December 1981

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Prepared for:
Naval Postgraduate School
Monterey, California 93940

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CONSIDERATIONS FOR DECISION-MAKING

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ABSTRACT

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I. INTRODUCTION

On Friday, the 8th of February 1980, there was a meeting in Office of the Israeli Minister of Defense Ezer Weizman. Among the participants were the Minister of Defense, his deputy, the General Chief of Staff of the Israeli Defense Forces (IDF), the Chief of Staff of the Israeli Air Force (IAF), and several more high level officials of the Israeli national security and defense industry establishment. After an eight hour discussion, a crucial decision had been made: to develop and produce in Israel a future advanced fighter aircraft, named "Lavi"^a (a lion) [1].

This was a concluding discussion after a long period of debates, prolonged over several years, and it was quite clear that the Minister of Defense decision would be approved by the Israeli government, as really happened several weeks later.

Two years earlier, on the 2nd of February 1978 the subcommittee of Security and Foreign Affairs recommended that Israel immediately commence the full scale development of the aircraft (at that time still called "Arie") and to view its development and production as a national effort, for which all resources required should be mobilized from the resources available to the State of Israel [2].

^aOnly after the "go ahead" decision was the name Lavi disclosed. Until then the name Arie (also a lion) had been used for the planned aircraft. Thus the name Arie appears frequently in the early literature. To avoid confusion, the name Lavi only will be used in this paper. In citations from pre-February 1980 the name Lavi is substituted for the name Arie.

The Subcommittee raised the arguments of arms self-reliance needed to meet possible long term embargoes; the political flexibility it might achieve; the economic, technological and social contributions; and more.

But the attitudes in the Subcommittee were conflicting.

One of the members said:

I tend to reject the tremendous investment. The self production resolves by no means the political dependence, but lays on our economy heavy financial burdens, which may affect severely areas like education, health and welfare. I think that Israel's self development should concentrate on arms which we can't expect to receive from others, and I don't think aircrafts are in this category.

This reflects the arguments that have taken place ever since the initiation of the Lavi program, and continue to be raised even now while the program is underway.

This paper attempts to explore the question of making an advanced fighter aircraft (AFA) in Israel, compared to the alternative of buying (only) from foreign sources. The analysis is done on the grounds of a broader view of Israel as an arms supplier and recipient, and AFA production aspects in the Third World and in Europe.

II. THE LAVI AIRCRAFT

1. General

Although the paper deals with the general question of "make or buy" advanced fighter aircraft (AFA) in Israel, the Lavi case may be used as a good actual illustration for that issue under question. As a matter of fact, the general case of AFA in Israel and the particular case of the Lavi are almost identical. Since the Lavi is going to be the only Israeli indigenous aircraft under development and production in the next decade or so, and since all the arguments in this paper are valid only for several years ahead (hopefully...), both cases may be considered identical. Thus, they will be discussed interchangeably in this context. As a consequence, the Lavi warrants a closer look.

2. Description

The Lavi is defined as a single-engined single-seat strike fighter [3].

It is described as the "working horse" [4], or the "back bone" of the IAF for the late 1980's and the 1990's. It is not supposed to be the leading edge of the IAF's fighter aircraft force [5]. As an unsophisticated, though highly maneuverable aircraft, the Lavi is supposed to replace some 220 McDonnell Douglas Skyhawks and 160 Israeli produced Kfirs [6] (numbers are quoted from "Flight International," 1 March 1980). It is aimed to meet the "quantitative" need of the IAF, and therefore it is designed as a multirole aircraft with a clear emphasis

on strike missions [7]. Thus, the Lavi will not replace the more sophisticated U.S.-made aircraft in the IAF's mix like the F-15, F-16 (and in the future, perhaps, the F-18). The need for these aircraft or their equivalent will remain for the next decade or more despite the Lavi production [8]. The Lavi is scheduled to enter operational service in 1988. The Lavi will be developed and produced by the Israeli Aircraft Industry (IAI), the large industrial conglomerate for aeronautical products. The technologies that are going to be used in the Lavi design are mainly existing ones, implemented in aircraft like the American F-15, F-16, the French Mirage 2000, the European coproduction Tornado and the Israeli Kfir [9]. This can explain its low R&D costs, estimated at \$570 million [10] (compared to R&D cost of about \$1 billion for the F-16) [11]. Another reason for the relatively low R&D cost of the Lavi is the fact that Israeli R&D labor hour cost is about one half of equivalent hour cost in the U.S. [12]. The flyaway unit cost of the Lavi was estimated as \$6.5 million in 1978 dollars. In the next 8 years Israel will invest in the R&D and production of the "Lavi" \$1 billion, as was announced by the Director General of the Defense Ministry on February 12, 1981 [13].

3. The Lavi's Engine

It is said that a jet aircraft design is tailored around its engine. The development of an advanced jet engine is considered to be more complicated and about twice as expensive as the development of the aircraft's total airframe [14]. Consequently, the decision about the Lavi's engine was as crucial as the

decision about the aircraft concept as a whole. It had substantial technological, economic and political implications.

The various publications about the engine choice may reflect the change in tendencies and concepts of the decision-makers through the engine source-selection process. Initially, there were talks about an Israeli developed engine. Pretty soon it had been recognized that this would be above the technological and economic capabilities of the Israeli industry. Then came the announcement by the Minister of Defense that the engine would be purchased in Europe, in order to reduce the Israeli dependence on the U.S., and Israel would insist on a guarantee of "no strings attached" to the engine purchase [15]. But then the designers faced another fact--there was no European engine compatible for an AFA of the 1990's. So there was no choice but to return to the few large American jet engine manufacturers, namely, Pratt and Whitney (P&W) and General Electric (GE).

For a year and more, the General Electric F-404 engine was mentioned as the selected one [16]. Moreover, a delegation of G.E. personnel arrived in Israel in October 1980 to negotiate the coproduction of the engine in Israel [17].

But in July 1981 a final decision had been announced: the engine of the Lavi selected would be the "Pratt and Whitney" F-1120, a reduced model of the existing engine F-100 (the latter is used in the F-15, F-16) [18]. Presumably the F-404 was found to be too small to provide, as a single engine, the power required for the Lavi. The decision-makers decided to take the risk of selecting an engine still in its development phase, instead of

compromising and degrading the operational requirements of the aircraft.

In any case, what is important to remember is that the future Israeli aircraft will use an American power plant. Although there is an American "green light" for the Israeli government to plan on the American engine, the exact conditions are unknown, especially with respect to the sale to a third country.^a

4. Coproduction Negotiations

Throughout the Lavi decision process, several coproduction negotiations took place.

The first case is the F-16 coproduction negotiations. According to ex-Prime-Minister Isaak Rabin [19], as a result of the Israeli acceptance of the American proposal for the second Disengagement Agreement with Egypt in September 1975, President Ford offered to Israel a purchase of 150 to 250 F-16s. Israel demanded a high level of coproduction, and delayed the transaction. The United States did not accept the demand for coproduction since it already had a heavy commitment for coproduction with the European consortium ("The Sale of the Century," 348 F-16s to Belgium, Denmark, Netherlands and Norway). The deal was not concluded until President Carter

^aNewsweek of September 14, 1981 tells that among a variety of enticements the U.S. had offered to Israel in order to bolster its economy, it has already dropped its objection to overseas sales of Israel's Kfir jet, which is subject to American controls because it has a U.S.-built engine.

took office. Then the F-16's to Israel were approved only as a part of the well-known "Middle East Aircraft Package", and the number was cut down to 75 [20]. Probably, if there was a coproduction agreement on the F-16s, the decision about the Lavi would have been different.

Several years later two major American firms--General Dynamics and McDonnell-Douglas were requested by Israel to collaborate in the development and the production of the Lavi. Each firm was asked to invest \$250 million in the development and to provide know-how and installations. Both firms responded with a list of off-set demands like purchase of more F-16s, usage of P&W engine (which is used by the F-16) for the Lavi, or purchase of F-18, DC-10 and DC-9 made by McDonnell-Douglas [21]. In fact, none of the negotiations has been concluded.

Another report tells about a proposal made by Northrop, which includes two conditions for coproducing the Lavi:

- a. The Lavi design would be based on the new model of the F-5.
- b. The Lavi will be powered by the same engine as the F-5.

Northrop declared that by such coproduction Israel would save \$300 million R&D costs, and about \$0.5 million per unit production costs. In addition Israel would gain advanced know-how, and new export opportunities [22]. It was quite clear that Northrop proposed a sort of production under license of its almost fully developed aircraft. The Israeli Aircraft Industry that looked for R&D challenges for its 2000 engineers could not accept the proposal.

In this context can be also mentioned the negotiations with the two F-18 producers, McDonnell-Douglas (F-18A, which will be a flying aircraft in the US inventory), and Northrop (F-18L, which is still on the drawing board) [23]. Both competitors suggested some share in production (especially generous with this respect was Northrop, which has been fighting for its market). Today, after the Lavi decision has been made, it is clear that even if the future purchase of the F-18 from either firm will include some off-set agreement, most of the Israeli production resources will be devoted to the Lavi [24].

The last collaboration to be mentioned is associated with the Lavi's engine. The agreement with P&W, the F-1120 manufacturer, includes technology transfer which will allow the Israeli factory Beit-Shemesh Engines to produce most of the components and assemble the engine. But P&W rejected a proposal for partnership in the Israeli firm [25].

5. Concluding Comments

a. The coproduction negotiations reveal one basic fact: none of the American firms went too far towards the Israeli requests. Naturally, each of them was concerned with profit and as a result was reluctant to sign an agreement, and stated too binding conditions. Consequently, Israel decided to go it alone with the program, a decision with significant economic implications, as explained in Chapter IX.

b. The Lavi has been introduced in this chapter without any further interpretation. But it should be emphasized that with the decision to go ahead and develop the aircraft, the

government has undertaken tremendously significant political, economic and social commitments. The magnitude of these commitments can be realized by examining the general case of advanced fighter aircraft (AFA) production, and by observing how it is handled in the Third World countries and in Europe. This is done in the next two chapters.

III. AFA PRODUCTION--A UNIQUE CASE

1. General

Among the conventional arms developed, produced and transferred worldwide, the AFA has a unique status. It is, perhaps, the most sophisticated and complex product of modern technology which is produced in large scale. It exploits a variety of advanced technological innovations, as well as state-of-the-art design concepts. These facts have some significant implications--economic and political, which will be analyzed in the following sections.

2. Economic Uniqueness of AFA

a. Initial Costs

A tremendous investment is demanded by the creation of initial research and development capability [26]. But even an industry who has the substantial capability should invest very large amounts of money for developing a new type of aircraft. For example, the R&D costs of the F-16 were a little less than \$1 billion [27]; the R&D cost of the Israeli Lavi are estimated at about \$600 million [28]; the R&D costs of the new European tactical fighter for the 1990's--the TKF-90--(collaboration of West Germany, France and Britain) are estimated at over \$1.5 billion [29]. Even more impressive are the costs of developing a new advanced jet engine. These are estimated at about \$2 billion [30].

The actual building of the production lines requires also a huge investment even where the basic facilities exist.

But they are much bigger where the production infrastructure should be established from scratch. Since the returns from the investments come several years later, one needs huge financial resources and a long run "economic breath" to embark on AFA development and production.

b. Implications of High Initial Investments

The high initial investment, or in other words--the high fixed costs--are shared by the units produced. The bigger the amount of units produced, the smaller the R&D cost per unit share. But in real life, in order to sell, one should establish competitive prices, which do not necessarily cover the large fixed costs. Only above certain volume of sales, fixed costs are covered, and sales generate profits. In the AFA case the fixed costs are high, thus the break-even point (the quantity of units at which the contribution margin equals the fixed costs) is at relatively high amounts. These break-even amounts for AFA are estimated between 200 to 400 depending on the specific case. Several sources estimate the minimal amount of Lavi aircraft to be produced as 200 [31], while others point to 300 as the correct number [32]. The Swedish estimated that 300 aircraft should be produced domestically in order to be economically equal to the alternative of buying American aircraft [33].

In almost every case (excluding the U.S. and the Soviet Union), the internal market is too small to absorb such large amounts, which causes the industry to be extremely reliant on the export market for its existence, as is true even for the arms industries

of the major West European states [34]. "In order to survive, indigenous defense industries must export," writes Michael Moodie [35], or as an Israeli Defense Ministry spokesman put it: "It is impossible for a small country to maintain an economically viable arms industry without exports" [36].

Another important feature of the cost-volume-profit characteristics of the AFA industry is the operating leverage effect. The operating leverage expresses the degree to which a firm uses fixed costs to generate profits. A high break-even point means high operating leverage. If the ratio is high and volume is highly variable, the risks and potential rewards are relatively large. In industries of this nature, and the AFA industry is certainly one of them, when volumes are beyond the break-even point, profits can be relatively large, but if volume is under the breakeven point, losses are relatively large as well [37]. This emphasizes again the need to exceed the break-even point of production, usually by producing for export. When the break-even point is exceeded, the AFA can be a very profitable commodity.

3. The Nature of the AFA Market

a. General

Each firm in the AFA production may be considered as a monopoly, while the market as a whole is regarded as an oligopoly.

AFA firms are monopolies because of the two main barriers to entry which are the sources of any monopoly power:

- Technical barriers to entry;
- Legal barriers to entry.

b. Technical Barriers to Entry

AFA R&D and production represent an innovative technology, a special know-how of low-cost productive techniques, and consequently high quality of output. Technological capability is a function of a long term effort, accumulation of experience and huge R&D investments. Thus, not only is the financing a barrier to entry into the AFA industry, but the technological capability is a harder barrier to cross.

This barrier is even higher while speaking about advanced engines. Innovations are achieved only by a "tier over tier" technique. For example, the manufacturer should strive all the time to increase the compression and the by-pass ratios; to increase the entrance temperature to the turbine; to improve the blades cooling; to achieve more efficient burning process; to develop better materials, etc. While airframe design is spread over many developers, who design separately the various components, the engine manufacturer must develop most of the components by himself. On these grounds it is understood that development of a new engine is a much more demanding effort than a development of a new aircraft [38]. There is no wonder that only three manufacturers are left in the western world for first-line advanced engines: the U.S.'s Pratt and Whitney and General Electric and the British Rolls-Royce. Even large and experienced firms like the French SNECMA have had difficulties which drove it to enter some sort of partnership with the American company, G.E. [39].

The "barrier of technology" can be by-passed partially by technology import, and sure enough, within the Third World,

the major arms exporters are those states which have concentrated most heavily on the acquisition of military know-how [40]. On the other hand, engine development and production is so demanding that none of the Third World countries possess a completely indigenous capability for engine production [41].

Most engine production processes are kept as industrial secrets, and they are almost impossible to copy from a complete product. As a result of the large fixed costs, the production of the AFA exhibits decreasing average and marginal costs over a wide range of output levels [42]. That means that the greater the output levels, the lower the costs. That is the essence of the "Economy of Scale" which is characteristic of the AFA industry. Only the large firms can compete in such circumstances.

c. Legal Barriers to Entry

Naturally, all AFA innovations are protected by patents which grant a monopoly position. Another legal barrier is the need for government license for coproduction or assembly under license between two or more countries.

Another form of a legal barrier can be an exclusive franchise given by the government to a local producer in serving the domestic market. In fact such is the case in almost all countries which maintain AFA industries.

d. The Oligopoly Nature of the AFA Market

Although the individual AFA firm may be considered a monopoly since it maintains those barriers to entry, there are actually many firms spread over several countries, which implies

that the market is in fact an oligopoly. Several factors enable this oligopoly to exist:

1) Product Differentiation. There are differences in types, capabilities, purposes and prices among AFA industries. Smaller industries try to find the areas least covered by the major ones, to concentrate on them and by that to achieve a competitive level of production.

2) Political Constraints. Political constraints that prevent a supplier from selling to a certain country, or prevent a country from buying from a certain supplier, may leave enough room for more than one supplier to exist.

3) Domestic Markets Protection. Domestic arms markets are often protected either by design or circumstance.

4) "Uneconomic" Sale. Some potential Third World AFA exporters may find it justifiable to export AFA even when sales are not, in the narrow sense, profitable, in order to earn foreign hard currency, demonstrate a level of technological sophistication, gain access to another country's market or to defend a political interest.

5) Third World Ideological Solidarity. This solidarity which is often no more than rejection of industrialized state dominance may create export opportunities in its own right [43].

6) Pure Competition. In some cases industries of the Third World may compete with the developed industries on purely economic grounds. Usually they have lower labor costs (Israeli labor cost is about one-half of that of the U.S.). In some Third World countries productivity tends to be high; they often

have access to cheap raw materials and sometimes cheap energy. They are in many cases free of environmental, health and safety regulations. They can leap-frog some of the earlier stages of technology, allowing the more developed states to underwrite the R&D costs, while learning from their mistakes [44]. (That is the case with the Lavi which is supposed to rely on the research works [that have been openly published] done through the development of the F-15, F-16, F-18, Tornado and Mirage 2000 [45].)

4. Political Uniqueness of AFA

a. AFA as a Political Tool

Several reasons caused the transfer of AFA to become an outstanding policy tool for gaining political leverage:

- 1) Being a scarce commodity.
- 2) The difficulties in entry to AFA industry and the monopolistic control on some components like jet engines.
- 3) The great demand for AFA in the Third World.
- 4) The need for follow-on support of spare parts and technical assistance during long years of the AFA life cycle.
- 5) Its high prices which require a special financing program, spread over a long time.

b. AFA as a Political Symbol

The supersonic jet fighter has long been perceived by developing nations as representing both the substance and the image of a significant arms transfer program [46]. This perception assigns to the AFA a symbolic political meaning. Since aircraft transactions are hard to hide, the publicity

given to every AFA sale amplifies the symbolic value of this weapon system.

5. Concluding Comments

The general characteristics of the AFA, which distinguish it from other arms produced and transferred worldwide, significantly affected the "make or buy" decision in the Israeli case. Some of the above mentioned characteristics play a role in favor of the "make" alternative; some raise doubts, and some clearly suggest the "buy" alternative. The specific considerations are examined in detail in the coming chapters, but not before observing the way some other arms producers cope with the challenge of AFA production.

IV. AFA PRODUCTION TRENDS IN THE THIRD WORLD AND EUROPE

1. General

Observations on the general trends associated with AFA production may provide a broad perspective for the evaluation of the Israeli decision about domestically produced AFA.

2. AFA Production in the Third World

Since the end of World War II the number of countries producing arms in some form has risen dramatically, especially in what traditionally has been considered the Third World [47]. Today, more than 30 developing countries produce weapons of one kind or another. Between 1969 and 1978 the number of countries capable of manufacturing or assembling major military equipment has more than doubled--from 6 to 14. It is estimated that the value of arms and military equipment produced in the Third World has more than quintupled in ten years: from less than \$1 billion in 1970 to over \$5 billion in 1979 (this figure excludes China). The value of arms exported by the Third World countries changed from \$49 million in 1969 to \$707 million in 1978, while their percentage of global exports (although relatively small), rose from 0.51% in 1969 to 3.7% in 1978^a [48]. Among the exporting nations the more noticeable are Israel, Brazil, Argentina, South Africa, India, South Korea and Taiwan.

But, in contrast to the dramatic picture drawn above, things are different where the AFA industry is concerned (the notion

^aSee Appendix A.

Advanced Fighter Aircraft is significant here since there is a clear distinction between AFA and any other aircraft production--transport, training--with respect to the issue under discussion). Only five countries are currently producing jet aircraft from indigenous design or under license: Israel, with its Kfir C-1 and C-2, based on the Mirage III airframe and the American G.E. J-79 engine; Taiwan has produced the American F-5 since 1973; Brazil and South Africa both produce versions of Italy's Aermacchi MB 326 and South Africa has also secured licenses for the French Mirage III and F-1; India has produced several jet combat aircraft including a number of versions of the Soviet MIG-21 [49].

Most of the above mentioned countries are veterans in the area--20-25 years. Although several countries (South Korea, Mexico, Indonesia, Argentina) have expressed interest or plan to develop capability for the production of jet aircraft, it is unlikely to see a great expansion of the exclusive club of the Third World AFA producers.

As indicated by the previously mentioned list, none of the five countries producing jet aircraft has a purely indigenous designed or produced one. Looking into the future, although India's industry is well advanced by Third World standards, its search for a new deep-penetration aircraft will not result in developing a new aircraft indigenously.

The best it can hope for is licensed production. (The Anglo-French Jaguar has been selected, because British Aerospace agreed to build a significant number of the planes in India [50].)

Another representative of the "club's" members, General Wu-Yeh, commander of Taiwan's Air Force, said: "It will be many years before we can build our own fighter, so we still need the support and assistance from the U.S. We can wait, but I am not sure our enemy will..." [51].

With all this in mind, the Israeli decision about domestically designing the Lavi can mark a large step forward toward the country's self-sufficiency in aircraft production. But even dealing with the most advanced aircraft industry in the Third World today [52], it still depends on American technology for the Lavi's power plant and, perhaps, in terms of some avionics, advanced flight controls, or terrain following radar. Without them, the plane would be no match for fighters whose acquisition is being planned by other countries [53].

3. AFA R&D and Production Trends in Europe

Several trends of the European aircraft industry may apply to Israel:

a. The Need to Export

The domestic market is too small to acquire the amounts required to make the production profitable. As aircraft have become more capable, more sophisticated and more expensive, the quantitative demand of the local air forces dropped. For example, the French Air Force ordered in the late 1950's 424 Mirage III fighters, but only 127 Mirage F-1, which appeared about 10 years later, have been ordered [54].

Thus, the French aviation industry is highly dependent on arms sales. Dassault is especially attached to foreign

markets. In 1976 almost 70 percent of Dassault's total business receipts were derived from military export. Aerospatial, larger and more broadly based than Dassault, and SNECMA, the principle producer of aircraft engines must also rely heavily on military sales abroad [55].

b. The Economic Benefits

In the previous section the need to export European AFA was presented as a vital means for the industry to survive, since domestic markets are not big enough. But AFA export, among other arms, is used to achieve a further goal--to contribute to the national economy. For example, it is argued that the economic, not strategic or foreign policy, considerations have become the major support for French arms transfers [56]. This leads to an aggressive commercial approach, mostly attributed to France, without too many restraints on whom it sells what.

c. Collaborations

The third trend in the European AFA industries is the tendency toward collaboration for development and production of AFA. Even the giant industries like the French Dassault-Breguet and Aerospatial, the British Aerospace, and the West German Messerschmitt-Boelkow search for collaboration. They need it to share the heavy burden of R&D and production costs, and to guarantee big enough markets, based on the cumulative demand of all states involved.

Today Western European countries are cooperating in the production of fourteen aircraft, ten aircraft engines and

eight missile programs [57]. In a list of thirty-two orders for French major arms, sixteen are for joint production items. The most significant joint production of European AFAs are the Jaguar (France, U.K.); Alpha-jet (France, West Germany) MRCA (West Germany, Italy, U.K.), and the future European tactical fighter for the 1990's--the TKF-90 (West Germany, France, U.K.) [58]. It is worth a notice that all these aircraft are driven by European-made engines.

d. Types of European AFAs

In their aircraft design concepts, the Europeans try not to compete with the superpowers at the highest end of the market, especially where export is concerned. On the other hand, in their collaboration aircraft, proposed mostly for self-consumption, the Europeans do pretend to reach the edge of technology. But, in fact, there is always a lag of several years compared to the U.S. state-of-the-art. These aircraft, usually less cost-effective than the equivalent American ones, are difficult to export. Therefore, the British, who gave up AFA export, try to sell the best at the lower end of the market, away from highly sophisticated items, and more manageable and cost-effective systems [59]. The French Dassault has prompted the Mirage 4000 program, as an aircraft exclusively aimed at foreign buyers [60]. Moreover, some argue that France's armed forces are forced to accept second-rate equipment since France does not have the resources to produce two lines of goods, and the lower quality arms sell better abroad [61].

4. AFA in Sweden--A Special Case

There are several similarities between Israel and Sweden with respect to the question of "Make or Buy" AFA: Both are small countries (although Sweden's population is about twice as large as that of Israel--8.3 million to 3.7 million in 1978, respectively^a [62]; both are technologically developed; both strive to achieve arms self-sufficiency; both have aircraft industries of about the same size (around 20,000 workers); both have not yet exported aircraft (though because of completely different reasons: Sweden because of self restraints and Israel because of "real life" difficulties, inspite of its efforts); both succeeded in producing good AFA in the past (e.g., Swedish SAAB Draken and Viggen, Israeli Kfir).

These two countries differ, of course, in their international status and circumstances, and in the threats posed on each of them. This is reflected in the military expenditures which are about 30 percent larger in Israel than in Sweden (\$3914 million compared to \$2932 million, respectively, for the year 1978). Since the Swedish GNP is more than five-fold times larger than the Israeli (\$85,373 million and \$16,123 million, respectively, for 1978), it is clearly understood why in Sweden military expenditures are only 3.4% of the GNP, while in Israel they are 24.3% (these figures are true for 1978) [63]. Both countries spend about the same percentage of GNP on education and health, and both are very sensitive to the social rights and securities of their workers.

^aFor additional comparative data, see Appendix A.

In the past, Sweden has produced its own aircraft. In order to prevent fluctuations in production it has geared the military procurement to the production cycle. In order to reap the other benefits of long production runs the Swedish Air Force has relied on multi-role combat aircraft, and has reduced the number of basic types in the aircraft inventory [64].

Yet, Sweden is dependent for almost 25% of its defense needs on foreign technologies, including an American engine for its Viggen aircraft [65]. In spite of the above mentioned, Sweden is considered virtually self-sufficient in arms production. This emphasizes the fact that very few countries are completely self-reliant in arms, if self reliance is strictly defined to mean producing indigenously everything that is used by the armed forces [66].

The Viggen-37 is supposed to end its role as a first line fighter, sometime around 1985. In the years 1974-1975, a new fighter was first mentioned which is now named the B-3LA. From the beginning the B-3LA has been perceived as a "light strike aircraft", about one third of the Viggen weight. The responsibility for the design and the production of the new aircraft has been assigned to the four "giants" of the Swedish industry: SAAB is responsible for the airframe and final assembly, Volvo for the engine design^a, M.L. Erikson for the avionics, and Bofors

^aAccording to a later source, the Swedish reached the conclusion that they were unable to develop the engine domestically, and as in the Viggen case, they had to import it. The alternatives they found compatible for the B-3LA were the P&W F-100 (or the smaller version F-112)), the G.E. F-404 and the Rolls Royce ORB 199. [1]

for the weapon delivery and gun systems. There was a lot of controversy around the new aircraft. Within the military community itself, the Air Force Commander argued that an armored assault helicopter can do the job better, and for the price of one B-3LA, 10 helicopters can be built. Others preferred various types of missiles to substitute the new aircraft. But the main objections were political and economic: some argued that Sweden, as a small nation cannot compete in the global competition for a new fighter, and it should purchase a finished or partially-finished aircraft from one of the superpowers.

The political arguments in favor of the self-production were as follows: first, Sweden would have not been able to keep its political independence without preserving its indigenous arms industry. Second, only domestically-designed aircraft can really fit the specific Swedish operational requirements.

But it seems that what has been most crucial in the decision was SAAB's statement that the actual meaning of a decision not to embark into the B-3LA production is a death sentence for the Swedish aeronautical industry within eight years. That meant also immediate firing of 1000 skilled personnel as a first step to laying off the 20,000 workers in the industry. Under this "threat", the government decided to finance the first steps of the B-3LA development [67].

Several similarities can be observed between the B-3LA and the Lavi case:

- In both cases the decision has been taken to pursue in indigenous production despite many contrasting arguments.

- The argument of political independence raised in both cases (although the underlying motives were very different between the two nations).

- In both cases the decision was to select relatively light, unsophisticated fighter types and to avoid competition with the big aircraft suppliers on the state-of-the-art aircraft.

- Both countries have been driven eventually to select American engines, despite their attempts to produce them domestically.

The Swedish example may support the controversial Israeli decision about the Lavi, but it raises several questions as well, as introduced in the concluding comments.

5. Concluding Comments

The general observations on the aircraft industry in the Third World and on the European leading producers, and the detailed look at the Swedish case, lead us to ask several questions with respect to the Israeli "Make or Buy" decision:

- Can Israel, a 4 million people nation, succeed in a task which multimillion-people nations of the Third World, like India or Brazil, haven't undertaken yet?

- Can Israel afford a full indigenous development and production of AFA economically, and can it accomplish it technologically?

- Can Israel manage without collaboration of some sort, or should it recognize that this is a vital need for a small country's AFA production, as the bigger and richer European countries have recognized?

- Should Israel view its AFA export as a significant economic tool as the European countries do?

- Is the domestic AFA production a real contribution to Israel's political independence as it is viewed in Sweden?

- Can Israel build her Air Force mix on self-sufficient aircraft only? Could the Chief of Staff of the Israeli Air Force (IAF) view the next generation of aircraft in his arsenal as assault helicopters only, as his Swedish colleague did?

- Are socio-economic considerations like maintaining employment, preserving skilled manpower, or maintaining the industrial base the main ingredients in the "Make or Buy" decision as they were in Sweden?

These questions and more will be answered in the coming chapters.

V. INDIGENOUS AFA AS PART OF THE IAF FORCE STRUCTURE

1. General

An indigenously produced aircraft must be viewed as a part of the general force structure and that is the way it should be examined. A number of questions arise, such as:

- Does its performance meet the requirements?
- Are the amounts consumed domestically economically justifiable?
- Does it really free the country from dependence on external suppliers?
- And more ...

can be answered only while analyzing the place of the indigenous aircraft in the general framework of the force levels.

A basic assumption is that for the next decade Israel will not be able to produce more than one type of aircraft at a time. Moreover, this aircraft is defined for the next ten years (at least) as a light, highly maneuverable fighter, proposed mainly for strike missions, namely--the Lavi. This aircraft is supposed to occupy the production lines up to the early 1990's.

As announced by the Minister of Defense, Ezer Weizman, the Lavi is not supposed to be the "tip of the spear" of the IAF. It is not the air superiority fighter. It is supposed to keep the quantitative factor of the IAF power, and to replace the getting-obsolete Skyhawks and Kfirs. It is a multirole aircraft but with obvious emphasis on air-to-ground missions [68].

So that is what we have to keep in mind while analyzing its role in the general IAF framework.

2. Characteristics of the IAF Force Structure

Israel, over the past ten years, has built and maintained one of the most sophisticated and modern military arsenals in the world [69]. Within the Israeli military arsenal the Air Force is the leader in technological advances, operational capabilities and costs. The security needs, operational experience, a capability to define what is actually needed and a reliable and capable supplier have all combined to produce the high levels of operational efficiency and effectiveness of the IAF.

The Israeli inventory includes types other than those which are most often sold to Third World countries. The real modernization of the IAF was started in 1962 by the then-considered highly advanced Mirage-III fighter-bomber. In 1968 large deliveries began of several hundred McDonnell-Douglas A-4 Skyhawks and F-4 Phantoms, to be replaced in turn by the new fighters for the 1980's--the McDonnell Douglas F-15 Eagle from 1977 and the General Dynamics F-16 from 1980 [70].

There are several unclassified estimates on the structure of the IAF--types and quantities [71], and it is left for the reader to decide which numbers to select. In a more general sense, we can observe that of these numbers, the so-called "high-low" mix consists of 40 F-15's (of which the last 15 are still to be delivered), 75 F-16's (of which 53 have been delivered up to the U.S. suspension on the 10th of June 1981,

and 14 more delivered when the suspension was lifted about two months later [72])--on the "high" edge of the list; Phantoms and Kfirs at the center; Skyhawks and Mirages at the "low" end. It is very likely that this concept of "high-low" mix will remain also in the future.

3. Future Needs of the IAF

Aviation Week and Space Technology describes the IAF's present and long term needs as including 600 modern tactical fighter aircraft. It continues, saying that Israel wants to replace its McDonnell Douglas A-4's and F-4's over the next 10 years. Thus the total replacements are counted in excess of 400 fighters [73]. Janes 1980 says that "approximately 150 Kfir C-2 were believed to have been built by the spring of 1979, with production then continuing at an approximate rate of two or three per month," and in addition to "two squadrons of the IAF that were equipped with the initial Kfir-C1 version" [74].

Having in mind the Minister of Defense's announcement that the Lavi should replace the Skyhawks and the Kfirs, we reach total replacements of over 400 again. If the Phantoms are added, the number is much larger.

Of course, it is naive to think that replacements are made on a one-for-one basis. Sure enough, the total mix is determined by a general assessment of the threat, and the "real life" possibilities and constraints, and not by any "replacement formula". It can be assumed that the IAF will try to fill some of the replacements by "high" end aircraft like additional F-15's, F-16's or purchase of one of the F-18 models [75]. Not only the

qualitative balance suggests additional purchase of those American advanced fighters. Since the Lavi are not supposed to enter service before 1988 [76], there is a need for existing aircraft to fill the gap through the mid 1980's. Candidates are almost exclusively the F-15 and the F-16 [77].

Nevertheless, from this "vague" quantitative analysis one conclusion can be drawn: the need for "center" and "low" aircraft, which is supposed to be met by the Lavi, is quantitatively large, possibly within the range of the numbers mentioned as a minimum for its economic justification, i.e., between 200 to 300 aircraft (see Ch. III, Sec. 2).

Another conclusion is that in order to keep its mix balanced, the IAF cannot give up the purchase of state-of-the-art, highly sophisticated aircraft, which are available only from external sources, namely, the U.S.

4. Will the Lavi Meet the Requirements?

All the previous analysis was based on the assumption that the Lavi would really meet the actual operational requirements of the IAF. But this assumption is by no means straightforward. The doubts are mainly economic:

- Will the vital funding flow through the whole R&D period, to assure meeting the performance and schedule requirements?
- Will the Lavi suffer huge cost overruns as happened to many such projects in the modern world? [78]

These economic problems will be discussed in more detail in Chapter IX. There are also some technological doubts:

- Does the Israeli industry have the required technological and industrial capabilities to develop and produce the AFA that would be compatible with the operational environment of the late 1980's and early 1990's?

- Is it assured that the Lavi will not be obsolete for the IAF 1990's requirements?

Apparently, there is linkage between the answer to these questions and the project's financing amounts and schedule, but it also depends on know-how and experience usually accumulated through time, that perhaps can be shortened but not skipped; it depends also on facilities which take a long time to build, and more.

While the economic questions are still argued in the Israeli public and government, a great confidence about the technological capabilities is reflected in the media and industry spokesmen. According to these publications, the IAI has engineers and technicians with a lot of experience and knowledge in design and development of aircraft. It masters modern technologies, spread all over the aeronautical spectrum (aerodynamics, metallurgy, propulsion, human engineering, electronics, etc.) [79]. This confidence is reflected in the general literature too, with statements like:

- "Of those Third World countries which have reached an advanced production capability...Israel stands out as the most technologically advanced" [80]. Or,

- "Today, Israel's aircraft industry is the most advanced in the Third World".

Of course, being the most advanced in the Third World does not mean automatically getting an admission ticket to the exclusive AFA manufacturers club. After all, the Third World is generally described as "comparatively disadvantageous in the endowment of virtually every factor to sustain an economically viable arms industry" [81], and thus lags behind the major arms producers, especially where state-of-the-art arms, like AFA, are concerned. But the Israeli confidence has several arguments to rely on:

- The industrial base and technological experience of the IAI has already proved itself in the past with a list of highly sophisticated products, including an AFA--the Kfir.

- Since the Lavi is not supposed to be an "elite" AFA, there is no need to make a pioneering work in exploring innovative areas. It can exploit technologies developed for the current generation aircraft.

- The Israeli industry has already shown that while concentrating on specific areas, it can achieve a level of sophistication not matched even by the U.S. Israel's electronic industry is the case in point [82].

- The indigenous aircraft development enables a close touch between the decision-makers, the designers and the users. In such a way, a more suitable aircraft to the local needs can be achieved [83].

- This same idea has been put in other words by Moshe Arens, Chairman of the Knesset's Defense and Foreign Affairs Committee, who told a group of journalists:

We have the ability to define the new weapon systems, maybe, more so than anybody else, because we have had to fight many wars and as a result have picked up experience on the battlefield as it is today. [84]

The last argument warrants a further discussion. No doubt, there are several examples where indigenous design and production allowed a developing country greater opportunity to match weapon specifications and operational requirements (e.g., The Indian new version of the Gnat, the Israeli Elta 2001 radar, or the Kfir avionics). But in many other cases weapon systems produced by Third World States are no more, and sometimes less appropriate for their needs and environment, than weapon systems that can be bought off the shelf [85]. It should be remembered that the Third World is a most attractive export market. Thus, in many cases systems are now being designed for it by the manufacturers (especially the Europeans). Moreover, since in most cases systems are not bought from the shelf, but ordered in advance to their production, modifications can be made according to the recipient requirements (if it pays the proper bill for that...). This opportunity is used widely by Israel. Modification can take place even after the system is delivered. Thus, at a minimum it can be said that in the Israeli case imported systems are not less suitable than the indigenous ones.

Regarding the indigenous systems, a question asked generally about the Third World indigenous arms production applies to Israel as well: Is the decision to initiate domestic production of a given system or to develop a specific branch of industry made after first defining defense needs and then getting the technology to meet those needs? [86] Given the variety of incentives

for initiating a domestic defense production, even in Israel, it is not at all clear that military considerations always take first priority. For example, in an answer to a questionnaire, 12 high level officers of the IAF involved in acquisition estimated that the socioeconomic considerations weighted more than 50% in the decision about the Lavi indigenous production [87].

In such situations, political trade-offs and bargaining among concerned groups is substituted for the neat, orderly process defined in theory [88]. It is completely legitimate and appropriate in a democracy such as Israel that the reasons why politicians may want a particular defense capability are probably not the same as those of the generals. In turn, these are different than industrialists' motives. Reading "between the lines", we can observe some of the above mentioned characteristics with respect to the Lavi case. It is mentioned in some newspapers that the IAI invested 200 million Israeli pounds (in 1978) in the initial development of the Lavi before any formal decision had been taken. That had been done with informal approval of the Minister of Defense of that time, Shimon Peres [89]. It can be assumed that in that phase, the IAI has based its design concept of the aircraft on its technological capabilities (and limitations), export prospects and estimated military needs of the IAF. It was not mentioned when the IAF entered actively into the design definition of the Lavi, but an answer to a question of the Chief of Staff of the IAF, Maj. Gen. David Ivri, reflected the attitude of the IAF at the time of the program initiation. General Ivri said that "the Lavi is not the

first priority of the IAF. In front of him stands those advanced weapon systems that we don't have resources to indigenously produce.... Although the Lavi may well integrate in the IAF inventory in the late 1980's, the development costs should not be financed by funds proposed to other vital weapon systems" [90]. This attitude is compatible with the general tendency of the IAF, characterized by an independent approach, and a reluctance to bind its requirements to home-made systems. The Arava case is a good example. In spite of heavy pressures from the industry and the Office of the Minister of Defense, the IAF refrained from purchasing the Israeli-made Arava, which at that time was not perceived as meeting its needs. (This has changed since then [91].)

Another report in the Israeli media says: "...facing severe shortcuts in the Defense budget, the General Chief of Staff, General Rafael Eitan, and other senior officers of the IDF (Israeli Defense Forces) Headquarters, demanded to cancel the Lavi project" [92].

These quotes reflect something less than enthusiasm towards the Lavi among the military establishment. Naturally, as those who are responsible for the actual fighting of Israel, they were worried about being forced to get something less than the optimal from the military viewpoint, either by getting the Lavi as a less capable aircraft than expected, or by giving up better ones that could have been bought abroad.

To conclude this point it should be emphasized that the major decision-maker on an indigenous aircraft is the Minister

of Defense, who is responsible for both the IAI (as a government owned industry) and the security needs of the nation. Thus, beyond contrasts of interests, the final decision is assumed to reflect some compromise without taking unreasonable risks. In addition, once a decision has been made, the IAF makes a maximum effort to achieve the best product possible.

5. Concluding Comments

From this analysis based on unclassified data, it is concluded that there is a role for an indigenous AFA in the IAF, at the "center" and the "low" end of the "high-low" mix. Thus the Lavi, if meeting the specifications of cost- schedule and performance, can be properly integrated into the general force structure. Moreover, a quantitative analysis (although superficial) points out that the domestic needs may meet the amounts defined as a minimum for economic profitability.

On the other hand, Israel, so different in her circumstances from Sweden and many other countries, can't maintain her vital military power without importing the most advanced aircraft in existence. Thus, the actual choice Israel faces is not just "make or buy". Rather, the actual alternatives are "make and buy vs. buy only".

By the very decision of producing an indigenous AFA, Israel has undertaken a lot of risks, as in any multiyear, multi-million dollar weapon system development. It should be aware of not taking additional risks by attempting to satisfy too many interests. Israel can't afford to let factors like

prestige of producing an aircraft--although less capable and more costly than the imported alternatives--override its military considerations (as happened in several Third World states) [93]. Israel can't afford to design weapons on the basis of how well they will sell abroad, and then force its military to adopt them, as France does [94].

On the other hand, considerations other than military ones should guide the decision-makers as long as they benefit the state, without risking its security. In such cases, they must not necessarily be economically profitable. These considerations will be discussed in more detail in the coming chapters.

VI. ISRAEL'S ARMS INDUSTRY AND ARMS TRANSFERS

1. General

The question of "make or buy" AFA in Israel can be properly analyzed--politically and economically, only in the general context of Israel as arms producer, exporter and recipient. This chapter will deal with the first two.^a

2. Overview

In Israel's case, self-reliance in preserving national security has been emphasized since the birth of the state. This attitude stems in large part from the historic experience of the Jewish people and the nature of the threat the new state confronted at the time of its independence. The fact that the threat has not dissipated in more than thirty years has only intensified national sentiment for maintaining security through national means. Israelis recognize that they are far from their goal of self-reliance, yet they are making every effort to come as close to that goal as possible [95].

Thus, the Israeli indigenous arms industry began as a result of purely security needs. At the time of its emergence, export intentions played only a minor role, if any. Even today, while export is a major factor in the Israeli arms industry, most of its products are domestically consumed.

Today, Israel is acknowledged as a leader of the Third World producers and exporters [96]. While many developing nations

^aFor additional data for this chapter, see Appendix A.

have some form of arms industry, only a few produce a wide range of weapon systems and defense-related equipment [97].

Israel is mentioned in the company of South Africa, China, India, Brazil and most European states, as being able to produce almost everything it needs [98]. Of the Third World countries that have reached an advanced production capability, Israel stands out as the most technologically advanced [99].

Israel's current indigenous defense manufacturing capability includes production of military and civil aircraft, air-to-surface and surface-to-surface antishipping missiles; air-to-air dogfight missiles; patrol boats; multimission combat vehicles; tanks; howitzers; mortars; grenades; guns; submachine guns; radar systems; communication and navigation systems; fire control systems; computers and computerized communication systems; and a lot more... [100]. Specific systems include: the Arava-STCL military transport aircraft; the Kfir fighter; the Westwind-jet transport civilian and military aircraft; the Jericho surface-to-surface missile; the Shafrir air-to-air missile; the Gabriel ship-to-ship missile; the Reshef missile boat [101]; and the Merkava tank.

The development of the weapons industry has been evolutionary. A good example of that process is the development of the Israeli Aircraft Industry (IAI)--the biggest and the most prestigious industry among the Israeli arms manufacturers. The IAI introduction, which is very significant to the essential issue of this paper, is presented in the following section.

3. The IAI--Development and Current Status

The IAI is state owned, like most of the Israeli arms industries [102]. Its establishment in 1953 was, perhaps, the most important event in the development of Third World indigenous arms industries in the 15 years following World War II [103].

During its development process it followed more or less the step-by-step process which is characteristic of most Third World state's domestic defense industrial development. Moodie describes this process as a seven step process [104]. According to Moodie the first step is the establishment of maintenance and overhaul facilities for the service and repair of imported arms. The IAI was established in 1953 to overhaul and service the aircraft of the Israeli Air Force with a charter for future production of aircraft, engines, spare parts components, ground equipment, electronics and other aeronautical equipment. The difficulty in obtaining spare parts for the IAF was a major factor in Israel's decision to develop an aircraft industry. This repair and overhaul infrastructure initially created--has been expanded today to the extent that the IAI now performs overhaul work on the aircraft of numerous foreign airlines [105].

Israel quickly proceeded through steps two and three of Moodie's development model, namely, domestic fabrication and assembly of aircraft components produced under license. In the late 1950's, the IAI began licensed production of the Slingsby sailplane for the IAF and flying clubs [106].

Looking ahead to step four, the Israeli's signed an agreement with the French Potez to manufacture the Fuga Magister jet

trainer in 1958. The first domestically produced Magister rolled off the production line in 1960. The IAI viewed the Magister program as a springboard to future aircraft production and immediately set about designing and substituting modifications to the basic Magister design [107].

By introducing indigenously designed components, the IAI was gliding smoothly along through the fifth step (namely, components for weapon systems are designed locally and incorporated into existing systems) [108].

While the Magister program was underway, the IAI became involved with the design and development of an indigenous aircraft, the Arava. Well aware of the international market for civil aircraft, the IAI decided to try to carve a niche for itself with the development of a short-takeoff and landing (STOL) transport that would fill a gap in the commercial market [109]. This clearly put Israel into step six of the development process. As an indigenously designed aircraft, the Arava was produced using only a few imported components of sophisticated technology (Pratt and Whitney PTGA-27 turboprop engines).

In the fighter business, it was the June War of 1967 and the subsequent French arms embargo that pushed the IAI rapidly beyond limited capabilities [110]. Following the French embargo on the delivery of Dassault Mirage 5 fighters to Israel, the decision was taken to manufacture aircraft of a generally similar design to the Mirage. Since the IAI undertook responsibility for manufacturing spares for the Mirage III CJ fighter operated by the IAF, it was capable of putting into production a new aircraft named "Nesher". This comprised a locally built

airframe, similar to that of the Mirage III/5, fitted with an Atar 9C afterburning turbojet and Israeli electronic equipment. The ultimate outcome of this policy was the "Kfir" [111].

The Israeli designed "Kfir", is a much-modified airframe of the Mirage 5, with American G.E. J-79 engine [112]. The late model Kfir-C2, has almost nothing in common with its ancestor, the French Mirage. It contains a different engine, significant airframe modifications, different internal systems (fuel, hydraulic, electric, etc.); completely different weapon delivery and navigation system; a different radar, and more. Almost all the components, excluding the engine, are Israeli designed and produced.

Thus, the IAI reached step six, while the seventh one--of completely indigenous designed systems, incorporating no imported components, is still beyond reach, mainly attributed to the engine.

As far as engines are concerned, Israel made large progress here too. Most of the activities on engines are concentrated in the IAI and Beit-Shemesh Engines. The engines department of the IAI was established 25 years ago as a repair and overhaul facility. Today it concentrates mainly on production of components and overhauls of large jet engines. It manufactures about 60% of the J-79 engine--the power-plant of the Kfir. It runs over 1000 engine overhauls for more than 30 organizations worldwide, mainly commercial airlines. It takes care of the modern F-100 engine of the F-15 and the F-16.

Beit Shemesh Engines was established in 1967 as a consequence of the French embargo. The Israeli government and the Jewish

President of the French Turbomecca firm, Josef Shidlovsky, invested equal shares to initiate the plant. The main product of the firm is the Marbore 6 engine, a relatively small jet engine that drives the Magister trainer. But Beit-Shemesh engines participate in the production of J-79 components, components for other Turbomecca engines, electric gas turbines, and more. About 30% of its products are for export [113].

After a long competition between these two engine manufacturers, Beit-Shemesh Engines has been selected to be the chief contractor for producing the P&W F-1120 of the Lavi, under P&W license. As a consequence, the government purchased Shidlovski's shares of the company. The latter held 51% of the shares, and the government wanted to assure its control on the vital activity of the Lavi engine production [114].

Today, the IAI is the government's conglomerate that is responsible for the majority of the nation's arms production. From a small aircraft repair and overhaul business in 1953, it has grown to become Israel's biggest single industrial enterprise, and it continues to grow [115]. The IAI employs more than 22000 people in its facilities, and about 5000 more in its subsidiary plants [116]. The Engineering Division employs about 2000 engineers, the largest single engineering group in Israel [117].

Although the IAI is a government organization, with government officials serving on its Board of Directors, the company has been a commercial success, with a solid record of consecutive years of profits and business growth [118]. The IAI exports

have grown dramatically in recent years. While the records show in 1974/75 only \$37 million exports, which were 18% of the total IAI sales, the next year it grew to \$55 million and 34%, respectively. In 1976/77 the exports were \$111 million which were 37% of total sales, and in 1977/78 \$145 million or 45% of total sales [119]. Exports almost doubled in 1978/1979 with foreign sales of \$260 million which are about 50% of the total sales [120]. This amount is about 35% of the \$707 million value of arms transferred by the whole Third World in 1978! [121]

From another source we learn that in the first 7 months of 1981 the IAI exports reached \$182 million (may be projected on the total of about \$350 million for the whole year) which are 80% larger than the same period a year earlier [122]. On June 10, 1981, the IAI celebrated the delivery of its 500th aircraft. This count includes 174 "Westwinds" [123], more than 80 "Arava's" and more than 150 "Kfirs" [124]. (The last one has not been exported yet, as will be discussed in more detail later in this chapter.)

Other notable products of the IAI are the antiship missile Gabriel Mk.3 (third version); weapon delivery and navigation systems; surface radars, EL/M-2200 series; airborne communication; flight control systems; and the new-borne Scout mini-RPV [125].

4. Israel as an Arms Supplier

a. Overview

The success story of the Israeli Aircraft Industry reflects the more general success of the Israeli arms industry as a supplier worldwide.

We have already discussed the technological capability of the Israeli indigenous arms industry, the spectrum of its products, and how close it is to complete self-sufficiency. This industry, which was established as a consequence of deep concern for the self-security of the State of Israel, soon discovered, like many of the Third World defense industries, that in order to survive it must export [126]. Moreover, Israel recognized the potential economic contributions arms exports might offer to its economy. As a so-called "Pariah" state, Israel could expect from arms exports to gain some access and, perhaps, influence in the international community. (The economic and political motives will be discussed in more detail with respect to the Lavi case in Chapters VIII and IX.)

Like other major arms exporters of the Third World, Israel has concentrated most heavily on the acquisition of military know-how [127]. By this approach it could create a solid base for future self-progress, and exploit the advantage of technology transfer; i.e., compared to hardware, it is much harder to control by the original supplier.

Paradoxically, the unfortunate fate of Israel, namely a continuing state of hostility and frequent breakouts of major wars against its Arab neighbors, has been, perhaps, the greatest promoters of Israeli arms exports [128]. The Israeli weapons could be designed on the grounds of the actual war experience of the reputable IDF. Moreover, many of them could be described as "Combat proved", like the Gabriel

ship-to-ship missile that had an extremely good record during the 1973 October War, when it destroyed at least 13 Arab ships, or the Shafrir missile [129] with an outstanding operational ratio of 50% kills-to-launches.

But the Israeli special security situation plays also as a burden on the Israeli export. On the one hand, by its indigenous arms industry Israel could keep some of the weapons classified, while the imported ones are almost completely disclosed in the official and commercial publications of the suppliers. On the other hand, the will to keep some surprises for wartime has been a "stick in the wheels" of the export effort. Thus we can read that the "IAI is facing a tough battle with Israeli government security officials over its campaign to export the Kfir." The Israeli government is said to be pushing the IAI hard to earn foreign currency from Kfir exports, but refuses to allow major aircraft subsystems to be exported for security reasons [130].

At any rate, the last argument is not a critical one, and apparently, this is not the reason for the Kfir's export difficulties. To conclude this section it must be stated that in spite of the various difficulties, Israel is the chief arms supplier among the developing states [131].

b. The Rise of Israeli Arms Exports

Israel's arms export program has been expanding dramatically for more than a decade. This growth is reflected in the increasing sophistication of its equipment, the broadening range of its hardware, and the global nature of its sales effort.

Since 1968 when it logged military exports of about \$10 million, Israel has boosted its worldwide sales to approximately \$300 million in 1976^a [132].

SIPRI places Israel as the largest Third World arms exporter with a total value of \$447 million exported from 1970-1979 (only major systems, in constant 1975 dollars). This represents 26% of total Third World exports over the referenced period. Israel's closest competitor is Brazil who exported \$349 million which was 21% of the Third World's total [134].

While SIPRI claims that it expects Israeli arms exports to be approximately \$1000 million per year by 1980 [135], we have confirmation from the Israeli Deputy Minister of Defense who announced that "the military export for the year 1980/81 is about \$1.25 billion". He added that "this occurred as a result of agreements with new customer states which can be considered as breakthroughs and reaching new horizons" [136]. On another occasion this same official, Mr. Mordehi Tzipori estimated the arms exports for the fiscal year 1981/1982 in the range of \$2 billion [137].

To emphasize the significance of the arms exports to the Israeli economy we can bring out the following fact: between the years 1969-1978 the percentage arms export/total export for Israel grew from 0.7% in 1969 to 2.6% in 1978, with a high of

^aSIPRI's figures are more moderate for this period, partially because referring to major systems only, and using constant dollars. According to SIPRI Israel's total value of arms supplied in the time period 1970-1976 was 174 million, which is still the first among Third World suppliers [131].

5.8% in 1976 [138]. This fact is outstanding when compared to a consistent average of 0.3% of the same ratio for the Third World, and declined from 2.6% in 1969 to 2.0% in 1978 for the developed countries [139].

A.L. Ross [140] claims that an indicator of progression of a developing country from dependence towards independence in arms production is the ratio of arms export/arms imports. Using the ACDA data [141], the following figures have been derived:

Table 1. Israel's Ratio Arms Exports/Arms Imports

1969 - 3%	1974 - 3%
1970 - 2%	1975 - 7%
1971 - 0%	1976 - 14%
1972 - 4%	1977 - 6%
1973 - 8%	1978 - 11%

The figures clearly represent a trend in favor of arms exports.

c. The Markets for the Israeli Arms Exports

Israel rarely confirms the details of its arms sales and is even hesitant to identify its clients [142]. The delicate political situation of Israel and sometimes of its clients, requires the transactions to be kept confidential.

The main market for Israeli arms is Latin America [143]. Among the customers we can find Argentina, Chile, Guatemala, Honduras, Mexico, Ecuador, El-Salvador and Nicaragua.

In other parts of the world there are: South Africa, Kenya, Taiwan, Thailand, Malaysia, Iran, and Greece [144]. Similar to the European countries, the Israeli government is heavily involved in the promotion of Israeli arms sales. As announced by the Deputy Minister of Defense, the recent breakthroughs into new foreign markets is attributed to initiatives of the new Foreign Affairs Minister, who directed the Israeli embassies around the globe to participate actively in the arms marketing effort [145].

Talking about the Israeli arms customers, the claim that Israel is inclined to sell arms to anyone can't be ignored, or as it was put in an Israeli newspaper, "to trade with states who stand at the margins of the nations' family" [146]. According to Business Week, "Israel sells to customers that have a hard time buying arms elsewhere. Among them are such controversial governments as South Africa, Nicaragua, Chile and Argentina" [147]. These sales to countries who suppress human rights, is supplemented by SIPRI [148] data stating that in the period 1970-1979, 35% of Israel's arms sales were to South Africa, 29% to Argentina, and 6% to El-Salvador.

An attempt to view these trades (which have never been formally confirmed) as an unrestricted, brutally commercial effort, might be mistaken. More balanced conclusions can be drawn if viewing the situation of Israel as a so-called "pariah" state, who faces international isolation, who lives under permanent threat to its very existence, and who should import all of its oil and other vital materials. With that in mind, the

arms trade relations with controversial countries can be identified by three categories:

- Sales in an attempt to break the international political blockade around Israel. To this category can be related the sales to most of the Latin American countries.

- Sales as a part of a general mutual assistance framework among international "pariah" states. To this category can be related the sales to South Africa and Taiwan (i.e., states with resources or technological advancements, who can really assist each other).

- Sales, grants or other assistance, in order to ease the direct threat to the security of Israel, mainly on the basis of common enemies. To this category can be related the assistance to the Kurds in Iraq in the 1960's and early 1970's; the arms sales to Ethiopia [149] (in order to secure the Israeli maritime traffic in the Red Sea); the assistance to the Christians in Lebanon (who fight the PLO and the Syrians), and even the recent "sensational" sale of some Phantom's tires and guns to the Khomeini regime in Iran (who have been fighting the Iraqi's) [150]. It should also be mentioned that in some of these countries, there are large Jewish communities of which Israel has undertaken indirect responsibility for their security.

Thus, it is clearly observed that the motives for the controversial Israeli arms sales are mainly political and not merely commercial. As such they can be better understood, though not always agreed upon.

d. The Israeli Experience with the Kfir Export

1) Overview. While the Israeli arms exports in general, and the IAI exports specifically, are a real success story, this is not the case as far as the Israeli AFA is concerned.

Naturally, dealing with AFA "make or buy" dilemma, the prospects of the AFA export have a primary significance.

In fact, Israeli AFA exports are not a complete failure. Several sources mention a sale of 26 Nesher fighters to Argentina [151]. According to Jane's, the transaction occurred in 1978-1979. At this time the Kfir, which moved into production in 1973 [152], had been on the production lines for several years. That might indicate that the sold Neshers were used, probably obsolete from the IAF viewpoint. But none of the sources mention even one export transaction of the much more sophisticated and capable aircraft, the Kfir.

2) Examples. Three examples may illustrate the kind of difficulties IAI has faced in its efforts to market the Kfir.

a) The Ecuadorian Case. In February 1977 the Carter Administration blocked the sale to Ecuador of 24 Israeli Kfir fighters. The U.S.'s right to veto the sale derived from the Kfir's use of G.E.'s J-79 engine [153]. Washington did so on the grounds that it did not want to introduce advanced aircraft into Latin America. But there was some speculation in Israel that the United States was merely trying to eliminate competition in the region [154].

In this case two points stand out:

- The fact that Israel was not capable of maintaining a complete indigenous production of the AFA, enabled the sale to be blocked. This is mostly true as far as American hardware is concerned, since the U.S. is more restrictive in its conditions to third party sales.

- Israel learned that competition with a major supplier, even a friendly one, might be tough.

b) The Taiwan Case. The Carter Administration announced in early June 1978 that it would allow the sale of up to 60 Israeli Kfir jets to Taiwan. Taiwan, however, did not find the proposed deal very attractive and it rejected the offer on both military and industrial grounds. It argued that the plane represented only a marginal improvement over the F-5E which it was already producing under U.S. license. It also contended that switching to an Israeli manufactured plane would require it to adjust to a new series of specifications and spare parts. Instead, Taiwan indicated that it wanted to procure American-made F-4 fighters.

A completely different explanation of Taiwan's rejection of the deal is found in an Israeli newspaper which quotes a high level Taiwanese AF officer, saying: "There are difficulties in the implementation of the deal. It can annoy some of the Arab oil supplying countries" [155].

The conclusions from this case are:

- Israel's choice to produce an aircraft which is not at the end of the state-of-the-art spectrum might be an obstacle in its

sale to more developed countries, who find it inadequate to meet their needs.

- Again, it is tough to compete with a major supplier, though very cooperative in this case, who can create arms transfer ties which are difficult to break.

- The fear of Arab economic retaliation on any deal with Israel might deter many potential buyers of Israeli weapons. Even those who have arms sales relations with smaller arms, might avoid aircraft transactions because of its perception as a symbolic political act.

c) The Austrian Case. In 1978, negotiations were disclosed between Israel and the Austrian government on the proposed sale of 24 Kfir aircraft. After long examination of the transaction, the Austrians gave up the deal, and turned to American and French alternatives. Finally, in the contest between the J-79 equipped F-16 version and the Mirage 50, the latter has been selected. The decision had been taken on the grounds of the French tempting offset agreement, the argument that it would better fit the neutral position of Austria, and a lot of high-level political arm-twisting [156].

Here again Israel's delicate political situation caused the failure of the deal. One cannot buy arms from Israel without being identified with the Israeli side in the on-going Middle Eastern conflict. That has been the reason why many of Israel's customers preferred discreteness, which is pretty hard to maintain where aircraft are concerned.

5. Final Comments

By most indicators, the Israeli arms industry is a great success. It is the most advanced technologically in the Third World, and it is the leading Third World's arms supplier as well. Israel does not lag far behind the large European arms suppliers. The Israeli arms industry and its exports continue to grow at an impressive pace. The future of this industry is more promising than ever.

But in contrast to this great success, the export efforts of an Israeli AFA, namely, the Kfir, have so far, failed. The question then becomes whether Israel should pursue its prestigious Lavi program or put the emphasis on products for export. If Israeli AFA exports succeed, they can reap more economic benefits than any other product [157].

On the other hand there are much more optimistic views like the one of the Deputy Minister of Defense, Mordehi Zipori, who spoke about an expected breakthrough of the Kfir sales, though refraining from detailing his reasons. He also mentioned that the new Reagan Administration tends to be less restrictive with respect to Kfir's sale [158].

It seems that the political constraints on the Israeli AFA exports will continue unless a radical political change occurs in the Middle East. Such a change may be underway as a consequence of the peace treaty between Israel and Egypt. But who can really predict the situation eight-ten years from now, when the Lavi is due for export?

This chapter found that:

- The export prospects of the Israeli arms industry in general are good. They imply a positive prospect for AFA exports as well.

- The political future which affects AFA exports is vague, but not necessarily unfavorable.

- The Lavi domestic needs are in the range of the investment return.

These findings lead us to conclude that worries about Lavi export prospects should not be a major ingredient in the decision to proceed or not with the program. While any export level would be desirable, lack of exports should not cause program cancellation. Considerations other than exports should get a higher priority. These are discussed in Chapters VIII and IX.

VII. ISRAEL AS AN ARMS RECIPIENT

1. General

We have already found that the actual alternatives Israel faces with respect to AFA are not "make or buy", but rather "make and buy vs. buy only". That means that the "buy" factor exists in any case. In fact, the arms bought abroad are not the only commodity that flows to Israel to maintain its security. There are other forms of security assistance which Israel gets, mostly (or even only) from the U.S.

In order to examine to what extent an indigenous AFA production might free Israel from external assistance, the magnitudes and tendencies of this assistance should be explored. Such exploration is provided in this chapter.^a

2. General Tendencies in the Israeli Arms Imports

Israel has been one of the largest arms importers in the world in the last decade. Between 1967 and 1976 it was one of the world's leading six recipients, in the company of South Vietnam, Iran, North Vietnam, Egypt, Turkey and South Korea, and more [159].

While in recent years the Middle East took the lead as an arms importing region (e.g., receiving 37% of the world's arms deliveries in 1978) [160], Israel has kept a high position within the ME. In 1978 Israel stood sixth in the world after

^aFor additional data to this chapter, see Appendices A and B.

Iran, Libya, Iraq, Ethiopia and Saudi Arabia. A year earlier it was second, behind only Iran [161]. Between the years of 1970-1976 the Middle East percentage of the Third World total was 51%, while Israel's percentage within the ME was 17%, equal to Egypt and second only to Iran (30%) [162].

Since the 1967 war Israel has had almost a sole arms supplier--the U.S. Between 1966-1975 the relative position of the U.S. in the total Israeli arms imports amounted to 96%, while France was far behind with 2.7%, the U.K. with 0.6% and all the others about 1% [163]. This percentage remains in later years. The U.S. share in the Israeli arms imports for the period 1974-1978 is \$4600 million out of a total of \$4800 million (96%) [164].

As far as aerospace equipment is concerned the picture is even more extreme: of the Israeli purchases in Europe, only 2% are for aerospace [165], which is about 0.0006 of its total arms imports...

For further insight into the Israeli arms imports, let's examine the percentage of arms imports out of total imports. In the Israeli case there is an increasing trend--from 9.5% in 1969 to 12.8% in 1978, with peaks in 1974, 1976 and 1977 (17.9%, 17.6% and 19%, respectively). These figures are more meaningful when compared to the general trends in the world. Not only are the percentages much smaller, but there is a decreasing trend in both the developing countries (from 6.8% in 1969 to 5.0% in 1978) and the developed countries (from 0.9% in 1969 to 0.4% in 1978) [166].

The total U.S. security assistance to Israel in recent years shows a relative stability (excluding a peak in 1979 to finance the consequences of the Camp David Accord) [167], despite the indigenous arms industry's growth in the same period. It seems as if the increase in self-produced arms in the IDF arsenal, and the hard currency earnings of the domestic industry, could hardly keep pace with the arms race in the Middle East, so the American assistance, although decreasing percentage-wise, should be kept stable in absolute terms. Therefore, it is assumed that Israel will continue to rely on U.S. assistance for at least the next five years [168]. Also, for the foreseeable future, the U.S. will continue to be the exclusive foreign arms source for Israel [169]. Being so predominant, the U.S. security assistance to Israel warrants a closer look.

3. The American Security Assistance to Israel

a. FMS and Commercial Arms Sales to Israel

Total FMS agreements between the U.S. and Israel between 1955-1979 have amounted to over \$9 billion, which is about 9% of the worldwide U.S. FMS for this period. It is next only to Saudi Arabia with 32%, and Iran with 15%, and exceeds any European country. A similar picture is revealed in FMS deliveries. Here Israel counts for 12% of the U.S. worldwide total--and again next to oil-rich Iran (20%) and Saudi Arabia (18%). While peaks are observed in the agreements pattern--in 1974 (rebuilding the forces after the 1973 war) and 1978 (Camp David Accord), the deliveries pattern is relatively stable throughout the years.

The magnitude of U.S. security assistance to Israel is reflected even more in the FMS Financing Program. Very different from Iran and Saudi Arabia who pay cash, Israel needs credits and grants to pay for the huge amounts of arms it purchases. So here Israel has held, for the years 1955-1979, about 56% of the total program. Out of the \$11 billions Israel received in these years, almost \$4 billion of the payments were waived. In recent years, annual credits of about \$1 billion, of which a half are waived, are kept to assist Israel in purchasing its arms from the U.S. (with an outstanding amount of \$3.2 billion for FY 1979, which includes also the financing of the withdrawal from Sinai, as required by the Camp David Accord).

In the commercial sales for the period 1971-1979, Israel also kept its place at the top, with \$935 million which are 11% of the U.S. total--more than any other country [170].

b. Economic Support Fund

The Economic Support Fund, whose purpose is to strengthen the strategic status of Israel by easing its economic pressures, is another tier in the U.S. assistance to Israel. In the three previous years, annual amounts of \$785 million has been given, of which two-thirds (\$525 million) were grants and the rest were loans [171].

4. Final Comments

As illustrated by the various figures in this chapter, the Israeli need for American assistance is very heavy. It totals about \$2 billion per year, of which about \$1 billion is in fact a grant. To emphasize the meaning of this assistance to the

Israeli security, it is acknowledged that the assistance program counts for about 55% of the total Israeli Defense budget [172]. Of course, the credits and loans are paid precisely, but that puts another burden on the Israeli economy. For example, projected 10 years ahead, Israel pays for FMS financing only, annual amounts starting at \$512 million, up to more than \$644 million [173].

The need for large assistance, as well as the need for arms flow from the U.S. to Israel will presumably continue for the next decade. The obvious conclusion is that an effort should be made by Israel to decrease its needs for security assistance and arms supply from the U.S. But, on the other hand, the present needs are so essential that no single act, even indigenous production of AFA, will completely free Israel from this basic dependence.

As a consequence, several questions arise:

- What dimensions and what nature of dependence does the present relationship between Israel and the U.S. actually create?
 - Is there a chance for Israel to become completely politically independent?
 - To what extent do the indigenous arms productions, and especially AFA, offer more political freedom to Israel, within the existing framework?
 - How does economic relief contribute to political independence?
 - What are the political benefits of an Israeli AFA production besides the bilateral relations between Israel and the U.S.?
- Chapter VIII will attempt to answer these questions and more.

VIII. POLITICAL CONSIDERATIONS

1. General

After acknowledging the Israeli needs for AFA; the capabilities and limitations of its indigenous production; the export prospects; and the special relations of supplier-recipient between U.S. and Israel, we can move to the political analysis of the issue under question. It is a little artificial to divide political and economic considerations since they are heavily linked. A healthier economy might require less assistance, and therefore, reduce political dependence. The division has been done for analytical purposes, but the above mentioned linkage should be kept in mind. As before, the analysis is done on the grounds of a broader view on motives for indigenous arms industry and questions of political dependence-independence, political influence, and the like.

2. Political Motives for Indigenous Arms Production

The first and foremost motive for indigenous arms production in the Third World has been the desire to eliminate, or at least greatly reduce, dependence on industrial countries for arms deemed vital for national security. Indigenous defense production is an expression of self reliance, and thus, it is a means of reducing a state's vulnerability to military and political pressures during times of crisis [174]. This sentiment was clearly articulated by an Israeli official in 1977: when asked what Israel needs to sustain itself in a crisis, he noted, "...arms, food and energy...we have to be independent

in the sphere of defense production to as great a degree as possible" [175]. His attitude was echoed by the Brazilian AF Minister in December 1977, saying, "The time has come to free ourselves from the United States and the countries of Europe. It is a condition of security that each nation manufactures its own armaments" [176]. The difference in the way both spokesmen put the same idea while the Israeli use the most essential terms associated with the very survival, expresses the perception of such independence in Israel. As an internationally isolated state, with an immediate and potentially overwhelming threat, and with only a single outside arms source, Israel has engendered strong self-reliance sentiments, not only within the leadership, but in the population as a whole [177]. Other political incentives for indigenous arms industry can be summarized as acquiring domestic regional and international prestige [178]. In this context prestige is by no means insignificant. It is synonymous with an expression of national sovereignty; it suggests national self-confidence, and validates international "great power status" [179]. These motives, especially the domestic, have much to do with the Israeli nation. In general, the supplier's political benefits of arms transfers are perceived as a means to express symbolic gestures of friendship, to gain and exercise influence, and to be used as a leverage for obtaining some specific political goals by supply or denial of arms covered by precisely tied agreements [180]. There are also direct military benefits like support for allies and friends. Some of the supplier's benefits, such as influence and leverage, are reciprocally perceived by the recipient. Influence, which is

perceived favorably by the supplier, is perceived by the recipient as dependence.- How these elements are implemented in Israel, as both a recipient and a supplier, will be examined later in this chapter.

3. The Meaning of Political Influence

In general, being dependent on an arms supplier means political influence of the supplier over the recipient. This has been recognized by both superpowers, the U.S. and the Soviet Union, who view arms transfers as a major tool for implementing their foreign policy objectives. Examples of general influence would be U.S. military sales to NATO, Iran, Saudi Arabia and Israel, and the Soviet Union to Warsaw Pact countries and Cuba [181]. For the purposes of this chapter, the influence of one country over the policy of another through the supply of arms will be defined as the ability to change or sustain the policies, goals or behavior of the recipient country [182]. It is likely that on any significant policy issue there will be an element of conflict between arms suppliers and recipients. Thus, in this context, the exercise of influence will typically involve resolving conflict between two states in ways that are consistent with the preferences of the supplier [183]. This influence can be generally broken down into two categories:

- a. Specific influence tied to specific circumstances.
- b. General influence concerning the recipient's long-term political behavior [184].

Cahn developed a table which counts the factors that determine the level of influence of a supplier over a recipient, and the

factors which determine the recipient level of not being influenced by the supplier or even to influence him in reverse (see Table 2). Some of these factors are supported by several authors. Kemp [185] is consistent with factors 1 and 2, saying that the supplier will maximize leverage when it is the sole source for arms. Thus, over time the U.S. probably has greater leverage over Israel, South Korea and Taiwan than over Iran, or Saudi Arabia which has money to buy on the open market. Quandt [186] agrees to factor 7, saying that arms recipients are more vulnerable to influence attempts in the midst of crisis that pose serious threats to their security, than in more normal times. More generally, decisions concerning war and peace are most likely to be influenced by an arms supplier. Quandt's proofs are taken also from the Israeli-U.S. relationships. Being strict with her influence factors, Cahn reaches the inevitable conclusion that Israel is the most susceptible to supplier influence attempts. Israel has had no alternate supply source since 1967; it is unable to pay for all its arms purchases and is dependent on the U.S. for critical components of indigenously produced weapons. In addition, Israel faces a real threat to its national survival and does not possess oil or other scarce high-demand resources in appreciable quantities [187]. In fact, this implicit conclusion is not necessarily completely true. As many authors write, there are limits to influence in general, and in the Israeli-U.S. case--in particular. Some of these limits are discussed in the following section.

Table 1 Influence Derived from Arms Transactions

Supplier's influence is maximized when the recipient:	Recipient's influence is maximized when the recipient:
1. has no alternate sources of supply	1. has multiple sources of supply especially cross-bloc
2. cannot pay for the arms	2. has the ability to pay
3. is a "pariah" state within the international community	3. has the multiple diplomatic and cultural relations within the international community
4. has no indigenous weapons-production capability	4. has an indigenous weapons-production capability
5. does not occupy a strategic geographic position	5. occupies a strategic geographic position
6. has a small storage capacity for spare parts	6. has ample storage capacity for spare parts
7. perceives a real threat to its national survival	7. does not perceive a real threat to its national survival
8. does not possess scarce unsubstitutable raw materials	8. possesses scarce unsubstitutable raw materials
9. requires supplier personnel for weapons maintenance and training	9. has sufficient technically trained indigenous personnel
10. perceives that receiving arms from supplier is particularly prestigious	10. perceives that the seller's prestige is "on the line"
11. has such a strong ideological orientation that switching suppliers is precluded	11. is ideologically unhindered in switching suppliers

3. The Influence of the U.S. Over Israel Through Arms Supply

a. Limits of U.S. Leverage Over Israel

In general, several writers think that there can be a tendency to exaggerate the supplier political controls or influence over the recipient [188]. SIPRI [189] put it in other words saying that there is no causal relationship between suppliers of arms and the creation of political goodwill at the receiving end. The first and foremost limit for influence is the essential fact that any sovereign country, even a small and dependent one, when its vital security interest is at stake, would take what it perceives as the required measures, even in a conflict with the supplier's wishes [190]. Recipient nations have a clear threshold of national interests which they will not sacrifice in favor of the supplier nation [191]. Countries will pay a heavy price to avoid letting the arms supply relations influence their foreign policy [192]. In such a case the recipient may be willing to risk loss of arms support in the short run [193]. There are many examples of the above assumption from the Third World in general, and particularly from the Israeli experience. Several examples may illustrate:

- Even after the initial embargo against Israel in 1967 and the impounding of 50 Mirage 5's by France, Israel launched an attack against Beirut Airport in 1968, using French Super-Frelon helicopters.

- Israeli use of American made cluster bombs in the strikes against Palestinian guerrilla sites in 1978 in contravention of restrictive accords with the U.S. [194]. (In general, Israeli

attacks on P.L.O. strongholds have often been subject to controversies with the U.S. through the recent years.)

- Israel ceased its fire in the 1973 October War only two days after October 22, the date on which it had agreed with the U.S. On the 23rd and the 24th of October, Israeli troops continued to advance on the town of Suez, and virtually cut off the Third Army in Sinai [195].

- Israel attacked on the 7th of June 1981 the Iraqi nuclear reactor in Baghdad, inspite of expected American protest. (This expected protest has been verified by the suspension for two months of F-16's and F-15's.) [196] Apparently, the above mentioned examples by no means suggest that there is no American influence on the Israeli policy in spite of the huge security assistance described in Chapter VII. The opposite is true. The question is--in what cases is this influence most effective?

Wheelock [197] emphasizes the distinction between coercion and inducement. Coercion involves the denial of ongoing or future aid, while inducement depends upon the promise to increase aid. Both are means for obtaining leverage which is defined as "manipulation of the arms transfer relationship in order to coerce or induce a recipient-state to conform its policy or actions to the desires of the supplier-state". Wheelock analyzes a series of Israelis-U.S. cases in the 1970's, including Rogers Peace Plan (1970), the October War (1973), the first and the second Egyptian-Israeli Disengagement Accords (January 1974, September 1975, respectively), and the Syrian-Israeli

Disengagement Accord (May 1974). Wheelock's conclusion is clear: Constraints imposed by policy objectives and diplomatic strategy limit the degree of coercion that the American policymakers may exercise. On the other hand, American inducements have proven more successful in affecting Israeli policy change. In other words, only arms transfer increases, and long-term American commitments to the security of Israel have achieved the U.S. policy goals and influence with respect to Israel. Quandt [198], analyzing some of these 1970's cases, arrives at the conclusion that the combination of first withholding arms then agreeing to provide them in increased amounts in return for a change of policy, could provide at least short-term results in the U.S.-Israeli relationship framework. Again, the inducement is an integral part of the preferred policy. Constraints on coercion stem from both the American and the Israeli sides. A policy of coercion might endanger the U.S. policy objectives: first, it has not induced reciprocity from the Soviet Union. On the contrary, it has possibly encouraged Soviet mischief [199]. Second, it may jeopardize the credibility of the U.S. security commitment to its friend and allies [200]. (In fact, increasingly, countries are questioning American reliability and credibility. Their perception of the U.S. as less willing and less able to come to their defense is a major factor in their self-reliance policy [201].) Another set of constraints on coercion policy towards Israel is the countervailing influence which Israel exerts in the United States through the Jewish community, and sympathetic members of Congress [202]. From the Israeli side, coercion may harden the resistance of the government, and bring

about a national consensus in viewing a situation as an attempt to violate vital and basically inflexible interests. To conclude this point--use of arms transfers to assist U.S. policy toward Israel has worked when the aid helped Israel to do what it wanted or found to be in its own interest. Efforts to use delays or denials on security assistance to soften tough Israeli negotiating positions have either had limited success or have had eventually to be coupled with massive aid commitments [203].

b. The June 10th 1981 Aircraft Delivery Suspension

The June 10th 1981 aircraft delivery suspension may shed some light on the effectiveness of coercion within the U.S.-Israeli relationships framework. On June 7, 1981 several Israeli warplanes attacked and destroyed the Iraqi nuclear reactor in Baghdad. This raid was executed by U.S.-made F-16's and F-15's. Three days later President Reagan, through Secretary of State Haig, informed Congress that "a substantial violation of the 1952 agreement barring use of American supplied arms for any but defensive purposes may have occurred." Mr. Haig said that a review of this entire matter would be conducted and the results reported later. Pending completion of that review, four F-16 jet planes that were due to be delivered on June 10 were held up [204]. When the review had provided conclusions satisfactory to the U.S., and the F-16's again were being delivered, Israel bombed, on July 17, PLO headquarters in the midst of Beirut, killing some 300 people, many of them civilians. President Reagan, participating in the Industrial Countries Convention in Ottawa, Canada, decided to expand the suspension. The

suspension later encompassed 10 more F-16's. On the 24th of July a cease-fire had been achieved between Israel and the PLO, with the U.S. intermediating between the belligerents. After the cease fire, on August 10, the White House announced that the ban also would apply to two F-15 fighters. On August 17, the United States lifted its two months suspension on the delivery of the 16 sophisticated warplanes. Talking to the National Security Council, Secretary of State Haig said that "the cease fire is a very positive new element in the region", but he refrained from stating whether Israel had or had not violated the agreement with the U.S. [205] This case emphasizes several issues:

- Israel had acted twice--the raid in Baghdad and the raid in Beirut--in clear conflict with U.S. policy, since it perceived these acts as vital to its self-defense.

- The Beirut raid occurred in the midst of an ongoing embargo, which emphasizes the Israeli policy hardening effect.

- The suspension caused angry reaction in Israel and the U.S., mostly on the point of violating a signed FMS agreement [206].

- The New York Times [207] editorial that wrote "there was never much doubt that Israel would get its 16 new warplanes from the United States, no matter how great American distress over its attacks on the Iraqi reactor and Lebanese civilians", reflected the confidence in the deliveries resumption both in the U.S. and Israel [208]. Such confidence apparently weakened the effect of the suspension.

- United States refrained from ruling about the 1952 agreement violation because ruling "pro" would mean backing the Israeli raids, while ruling "con" would have meant cutting off any further government-to-government military sales and financing to Israel. This points out that the suspension was in fact against the essential long-term American interest.

- The Reagan administration may demonstrate the cease fire was an outcome of the suspension, but one can assume it would have been achieved anyway since it was in the Israeli interest: Under heavy shelling on the northern settlements, and a recognition that conditions were still premature for an invasion of Lebanon as the only means to completely stop this shelling, Israel seemed to be seeking this cease fire.

c. Susceptibility to Influence in Crisis

The previously described suspension case is taken from a relatively calm period. But there is no doubt that things are different in a crisis situation. The October 1973 example is a good one to realize that even a country with relatively developed arms industry, like Israel, could not be completely self-reliant in wartime. This is at least true in the Middle East where wars are extremely intensive, highly sophisticated and with a large attrition rate. The need for aid is amplified by the involvement of the superpowers on both sides. Israel cannot rely on itself only, while the other side is supplied by the Soviet Union. That explains why Israeli leaders were shocked by the delays and reluctance that colored the support the U.S. gave Israel in the first days of the 1973 war [209].

The 1973 October war reveals two facets to U.S. influence over Israel. Some examples suggest increased influence: Israel's Prime Minister Golda Meir disapproved a preemptive attack on the 6th of October morning, with the argument that initiating the fire by Israel may endanger the American aid that Israel would need later in the War that was known for sure to break out in the same day's afternoon. Another example was Israel's agreement to cease its fire on the 24th of October with a considerable reluctance, since the decision was made to stop short of full military victory. When asked subsequently why Israel had accepted, Defense Minister Dayan stated "We had no choice", and Chief of Staff Elazar agreed that "we were compelled to agree". Apparently Kissinger and Nixon had evoked the issue of arms supplies, and, as Dayan was later to state, the shells Israel was firing in the afternoon had only arrived that morning from the U.S. In those circumstances, a refusal to comply with the U.S. demand was almost unthinkable [210]. On the other hand, there are opposite examples: A cease fire was agreed after negotiations between Kissinger and the Soviet leadership and was to go into effect on October 22. Stopping briefly in Israel on his return from Moscow, Kissinger felt that the Israeli leadership had agreed with the desirability of ending the fighting. The following day, October 23, stating that they were responding to violations of the cease fire by the Egyptian Third Army, Israeli troops continued to advance on the town of Suez, and by October 24 they had virtually cut off the Third Army in the Sinai [211]. Beyond the question of whether there were

violations of the cease fire or not, it was clear that Israel took the freedom to complete the Third Army cut off which was vital to it for the post war negotiations.

The main limitation on the U.S. coercion policy in a crisis stems from the fact that it faces a major choice: whether it was ready to see its ally lose a war or not. The outcomes of such a loss are so severe for the strategic interests of the U.S. that it must overlook many controversies in order to prevent such a loss. Thus, Nixon had to change his policy of unilaterally holding off the aid to Israel, in an attempt to force a cease fire. Facing the massive Soviet airlift to Syria (Oct. 10) and Egypt (Oct. 11), Nixon ordered the rapid arms deliveries to Israel [212].

d. The Distinction Between Short-run and Long-run Influence

The previous examples bring about an implicit conclusion: Israel vitally needs the aid of the U.S. for both the annual, reasonable levels of the security assistance program, and in a crisis. This can be achieved as long as the U.S. perceives its interest in keeping Israel strong and secure. President Carter expressed this commitment with the words: "We will remain faithful to our treaty obligations and will honor our historical responsibilities to assure the security of the state of Israel" [213]. The commitment of the U.S. to Israeli security cannot be based only on the "historical responsibilities" between the two countries, and the support of the American Jews. Israel cannot afford long run divergence from the common interests with the U.S. Therefore the state of the relations with the U.S. is a significant ingredient for every Israeli decision-maker. It was clearly put by Ex-Prime Minister Rabin in an

interview to an Israeli newspaper: "What is our alternative besides leaning on the friendship of the U.S....U.S.-Israeli understanding is a crucial condition for Israel's security strengthening, and its political maneuvering freedom" [214]. No wonder that in order to secure the U.S. long run commitment, Israel wished to have a formal treaty with the U.S., including offers of base rights, as stated by Prime Minister Begin in a speech in the Knesset (Israeli Parliament) [215]. "I express hereby our wish for a formal defense treaty, but I am not going to raise the issue formally to the U.S. because I don't like to be refused."^a Thus, in the long run a great deal of U.S. influence is underlying the Israeli policy. This influence involves what Quandt [217] calls "anticipated reaction", in which the arms recipient anticipating an influence attempt on the part of its supplier, decides to preempt by altering its behavior to conform to its expectations of the supplier's preferences. Each party feels that "something is happening" that would not occur without the provision of arms.

^aIn fact, the issue has been raised in some way during Begin's visit to the U.S. in mid September 1981. As a result of the Reagan-Begin talks, a new "strategic partnership" was announced. As announced by Secretary of State Alexander M. Haig Jr., "the strategic relationship, the strategic partnership, the alliance, if you will...", is to protect the Middle East from a common threat to the region--the Soviet threat. The practical steps will be combined military exercises, American military stockpiles in Israel, and strengthening the ongoing strategic dialogue [216]. This is still short of a formal defense treaty which the U.S., from its own perspective does not want to have with Israel. But it is one more step in tightening the relationship between the two countries.

On the other hand, the limits on coercion, and the Israeli confidence in the long term commitment of the U.S. to its security needs, leaves a lot of room for short term political freedom. Thus, in the existing relations framework one can easily come to the conclusion as put by the New York Times editorial [218], that "embargoes may buy time but little else." (This has not been perceived so by the Reagan Administration in the F-16 deliveries suspension, unless we assume that it is supposed to be a temporary suspension from the beginning, aimed mostly to satisfy the U.S.'s Arab friends, and not so much to punish or influence Israel.) What is the effect of the indigenous arms industry, and especially the AFA production, on the short and long run political independence of Israel? That will be explored in the next section.

e. The Contributions of the Israeli AFA to the Political Independence of Israel

The Yom Kippur War experience indicates that in crisis situations, indigenous industries may not be able to keep up with defense needs [219]. It is estimated that the 18 day "Yom Kippur" War in 1973 cost Israel \$7,510 million. Virtually all losses of war material have been replaced from U.S. stockpiles and assembly lines [220]. The emergency assistance during the war totaled \$2,183 million [221], and FMS agreements in the following year reached \$2,455 million. Even if we take into consideration that as a result of the 1973 war, military stockpiles have been increased significantly, and the indigenous arms industry has developed as described before, there is still a need for massive American aid in case of all-out war. At

least if the other side is supplied during that war would this be true. This brings us to a more general conclusion that, in the modern world, a country that is located in a strategic region and is in a state of war or threat of war, cannot stand alone without being "sponsored" by one of the superpowers. Moreover, a superpower cannot stay indifferent to such a country if its adversaries are supported by the opponent superpower. Therefore, neither a highly developed domestic arms industry nor AFA production can free Israel from its substantial need for U.S. assistance. This can be changed, if ever, only by a major politico-strategic change in the region, namely, progress toward resolution of the Israeli-Arab conflict. On the other hand, indigenous arms industries may increase the short run political freedom, which exists to a degree anyway. Short of a crisis--indigenous arms industries may enhance the political flexibility by compensating delays and embargoes [222]. The latter have only a long run effect, but in the existing circumstances they don't stay in effect for very long. The economic contribution of an indigenous arms industry may provide some stability to the security assistance flow. From another aspect, indigenous production of AFA or, say, cluster bombs, may resolve controversies about the usage of American equipment, and Israel would be able to maintain such understanding as it reached with the U.S. as a resolution of the Iraqi reactor raid controversy [223]. (Though, it is doubtful if Israeli AFA is capable of such operations as the raid in Baghdad. Presumably Israel will keep the freedom to use any equipment it possesses, for vital purposes that cannot be executed otherwise.)

Paradoxically, because Israel cannot be completely self-reliant in the foreseeable future, it has a considerable degree of freedom to select those arms types it prefers to develop and produce domestically. Since it cannot produce everything, it can choose those arms that will enable it greater short run political benefits, and are technologically and economically preferred. Is the new Israeli AFA, the Lavi, a preferred commodity in that sense? AFA indigenous production, as the most sophisticated product of the conventional arms industry reflects, perhaps more than any other system, the statement that "Instead of creating independence, indigenous production creates a new set of dependencies" [224]. The form of dependence has shifted from arms transfers to technology for producing arms transfers [225]. This is also true with respect to the Lavi, especially concerning its engine. Actually, many in Israel argue that the Lavi decision is not the right answer to the dependence problem. The IAF Chief of Staff, Maj. General Ivri concludes comments about the Lavi with a question, "Would the 'Lavi', without an indigenous engine, really give the resolution we are interested in?" [226]. Among the opponents to the Lavi production in the Security and Foreign Affairs Committee was also ex-IDF Chief of Staff, General Bar-Lev, who argued that the investment is too high. It is doubtful if the aircraft would be exported, and the dependence would remain because of the components that would eventually be imported [227]. A similar tune is heard from some of the commentators in the Israeli press [228].

To strengthen these arguments comes the fact that not only is technology import required, but the Lavi development depends to a great extent on American financing [229]. But even those who argue that the dependence remains would agree that the self-made AFA provides much greater short run political flexibility than finished imported systems. Technology transfers are harder to control and safeguard [230]. Even in cases of imported components the control is necessarily looser. Although the Kfir export could be blocked because of being equipped with American engines, the U.S. has never defined Israel's usage of Kfirs in PLO site attacks as "inappropriate use of U.S.-made equipment", as it did with respect to fully U.S.-made aircraft.

The lead time until delay or embargo starts to take effect is much longer dealing with components to self-production than in the case of completely imported products. It is easier to bypass components' embargo by indirect supply routes, as has been proved by Israel during the 1967 French embargo. And once you have the know-how, it is yours forever. Thus, within the framework of the long term and crisis time dependence, the Lavi would contribute to the short run, day-to-day political flexibility of Israel. This is true despite American technology, components and financing provisions for its development and production. In the examination of whether there are other weapon systems whose contribution to political flexibility would be greater, several considerations should be taken into account besides the level of technological independence in their production:

- What is their operational impact in current operations and in all-out war, compared to an AFA?

- What are their relative political benefits besides the dependence questions?

- What are the socio-economic impacts of their production, and of giving up the AFA production?

It seems that the economic question is the most crucial one, as explained in Chapter IX.

5. International and Internal Impacts of Indigenous Israeli AFA Production

a. Overview

Besides the major issue of dependence, associated mostly with the Israel-U.S. relationship, the indigenous AFA production has several other significant impacts on the foreign and domestic Israeli policy. This section addresses these impacts.

b. Political Benefits of Israel as a Supplier

It is generally accepted that Third World countries do not search for political influence in their arms transfers. Even the major European arms exporters do not. The predominant motive for both categories is the economic benefit. As far as Israel is concerned, some argue that Israel's indigenous arms industry viability, like many others, depends upon exports. Therefore, Israel must sell to all who are willing to buy, including such outcasts in the international community as South Africa and Chile [231]. As explained in detail in Chapter VI, there are strong political motives behind the Israeli arms transfers. These motives can be divided into three categories:

- Sales in attempts to break international isolation (South America, Southeast Asia and African countries).

- Sales as a part of mutual assistance between relatively developed "pariah" states (South Africa, Taiwan).

- Assistance to countries or movements who share a common enemy with Israel (Lebanese Christians, Kurds in Iraq, and even, perhaps, the current Iranian regime).

No doubt that AFA exports to the first two category countries may benefit the political interests of Israel. The symbolic perception of an AFA transfer amplifies these benefits. On the other hand the special nature of the AFA may be an obstacle to its export.

From another viewpoint these sales may jeopardize the delicate Israeli international position. In the eyes of those countries who are not aware (or prefer not to be aware) of Israel's special situation, Israel is perceived after all as having no political or moral restrictions in its arms sales. This can detract from Israeli moral arguments against European arms sales to some Arab countries. In any case the potential political benefits of the AFA exports suggest that it be produced, although by no means play a major role in the overall considerations.

c. The Prestige and "Overall Power" Factors

Several authors count the prestige acquired by means of indigenous arms industry as one of the motives for its development [232]. An effective arms industry reflects a wide range of resources, human and otherwise, that a state can

marshal, and it demonstrates a degree of self-reliance that other nations cannot achieve. Arms industries may suggest a "great power status" for the country, at least in its regional context. It is hard to assess to what extent the Israeli indigenous arms production capability contributes to its overall perception in the eyes of its neighbors. If it does contribute, AFA production is a significant factor in this contribution. But we can assume that in the Israeli-Arab context the most prestigious factor is the total military power and the combat capability of Israel, in which the indigenous arms industry is not the major component.

d. The Domestic Socio-Political Factor

Perhaps more significant than external prestige is the domestic socio-political effect of the Israeli AFA. Goldstein [233] writes that "the national arms industry may be little more than a psychological support; nonetheless, it is strongly associated with sovereignty and national strength". And truly, in Israel, perhaps more than anywhere else, the national morale and strength are crucial ingredients in standing under pressures, in war and peace as well. The perception of the strength and confidence counts more than the objective facts. According to Moodie [234] while the degree of dependence on arms imports remain quite strong in objective terms, in regard to perceptions the state may feel greater flexibility, and in international politics it is the perception that determines behavior. That is the case with Israel too. The striving for self-reliance is more than just pretension of leadership. The historic

experience of the Jewish people, together with an immediate and potentially overwhelming threat at the time of independence and today, has engendered strong "go-it-alone" sentiments, not only in the leadership, but in the population as a whole [235]. Thus, an indigenous arms industry, especially with a prestigious, highly sophisticated product such as AFA, may contribute a lot to the internal immunity of the Israeli people. In many cases indigenous arms are disclosed, usually on special occasions like the Day of Independence and get a lot of publicity in the communication media. In the June 1981 election campaign, politicians of the ruling Likud Party cited the progress in arms production and exports as one of the greatest successes of the government. They even complained that they had to refrain from disclosing more, and by that, missing one of their strongest electoral attractions [236]. This does not suggest that the government's prestige is a major ingredient in the decision of the Lavi, since it is not compatible with Israel being a progressive democracy. Rather, it emphasizes the significance the Israeli public attributes to the issue.

In the media some argue that a "national project" like a development and production program for AFA, would contribute to better allocation of income, close social gaps, and affect the quality and self-image of the Israeli society as a whole. It would contribute to the public welfare more than direct allocation of resources to welfare [237]. But, of course, there are also some who fear from potential social effects of such a grandiose project. Those argue that because of the budgetary burden the project imposes, there would not be sufficient

funds for lodging, health, education and welfare. Others mention the moral aspect of being "the merchants of death", or being identified with repressive regimes. Others warn against the danger of creating an industrial-military complex, which dictates decisions according to its interests which are not necessarily identical to those of the society in which it is acting [239]. Again, the Israeli democracy is too deeply rooted to reach such extreme levels, but even within a democracy, there can be an aggressive struggle of interests. In general, most of the sociological aspects are in favor of indigenous AFA production. Those who oppose such production are mostly indirect issues concerning the export policy or the economic ramifications. The latter are discussed in the next chapter.

6. Concluding Comments

The ideals of self-reliance and the striving for political independence have always been substantial motives in Israeli policy. But in the current and future circumstances it is unlikely that Israel can afford to give up or reduce substantially the American security assistance. Indigenous arms industries cannot change the basic situation, and thus Israeli policymakers should be aware of maintaining the long run commitment of the U.S. to Israel.

On the other hand, the degree of U.S. influence over Israel, or Israel's political dependence on the U.S., are reduced by American limits of leverage, and by the so-called "reverse leverage" of Israel over the U.S. Within the long run commitment

arms flow is more or less assured, though not immune to temporary delays and embargoes. In such cases, indigenous arms industries, including AFA production, may contribute significantly to short run political flexibility. In that sense, even systems based on imported technology or components may help.

The recognition that the need for U.S. arms is a durable one, paradoxically enables Israel to select the weapon systems it prefers to develop and produce. The criteria for preference are mostly economic and technological. This is not to say that political considerations have nothing to do with the selection. On the contrary, factors such as contribution to the political independence, overall prestige, domestic morale and confidence, and bridging to other nations, play a significant role in the decision. But the economic considerations and especially the domestic ones, are more crucial in this case. These considerations are discussed in the next chapter.

IX. ECONOMIC CONSIDERATIONS

1. General

Economic benefits are major motives for maintaining indigenous industry not only in Israel, but in worldwide arms producing countries. Several economic incentives play a role in the drive to maintain indigenous arms industries:

- Improving the balance of payments by substituting arms imports for domestic production, and as a further step--by exporting arms.
- The positive impact on employment.
- The contribution to the domestic industrialization.
- The spin-off effect on civilian products, technology and sales [240].

But there are economic problems as well, associated with domestic arms production:

- Indigenous production frequently turns out to be more expensive than originally estimated and is sometimes even more expensive than buying the complete weapon abroad [241].
- Shortage of economic resources.
- Negative effect on an ill economy by contributing to inflationary process.
- High risks in devoting tremendous resources into developments with unknown results, and into production with unstable markets. These benefits and risks are discussed below.^a

^aFor supplementary data to this chapter, see Appendix C.

2. Balance of Payments

a. Overview

As mentioned before, indigenous arms industries, including the AFA production, may contribute to the balance of payments in two ways:

- Creating foreign-exchange savings by substituting domestic production for imports [242].

- Earning hard-currency through arms exports and by that, offsetting balance-of-payment deficits [243].

In the Israeli realm, the balance of payments deficit is one of the severe illnesses of the economy. This deficit can be mainly attributed to the high defense expenditures, half of them in foreign exchange, and the lack of natural resources in the face of increasing world oil prices.

But there are some candles in the general darkness. The surplus of imports over exports for FY 1980/81 was predicted as \$3.3 billion, compared to \$2.8 billion in FY 1979/80. In fact, the deficit decreased to \$2.3 billion, \$1 billion less than estimated. For the first time in Israel's history, 72% of the imports of goods and services, including military imports, were covered by exports. This is compared to only 50% in the mid 1970's [244]. No doubt that this achievement is attributed mainly to the \$1.25 billion military exports in that same year.

The above facts verify Day's [245] words, saying that the Israeli leaders see the export of weapon systems "as a quick and profitable way to translate the nation's war experience into economic advantage."

b. The Effect of Indigenous AFA Production on the Israeli Balance of Payments

The first subject for examination is the saving of foreign exchange by substituting domestic production for imports.

On the face of it, it looks pretty obvious: by acquiring over 150 "Kfirs" or 200 "Lavis" from its own industry, Israel can save the expenditure of several billions of dollars which might have been spent for buying American aircraft instead. But don't forget that large portions of the Israeli payments to the U.S. are waived. Would Israel keep getting the same amount of grants (or waived payments) if it reduces its purchases from the U.S.? The rest of the financing program is given as credits and loans. Is Israel ready for a change in these conditions which are economically favorable?

In fact, American dollars, which are proposed for buying American arms only, are much more easily available than the Israeli "Shekels" needed to be invested in the indigenous AFA development or purchase. Moreover, inquiry of the FMS agreements and deliveries tables [246] does not indicate any decrease in dollars spent on arms purchases in the years of the great growth of the domestic arms industry and especially while large numbers of the Kfirs are acquired.

The answers to these questions are by no means straightforward. Starting with the last one, it can be stated that the contribution of the indigenous industry to foreign exchange savings is significant. It is indicated by the fact that in spite of the inflationary devaluation of the dollar; in spite of the arms race in the Middle East; in spite of the extreme growth in arms prices--the nominal assistance dollar

amounts remained about the same in recent years. Without indigenous industries, dollar expenditures would increase significantly, or the IDF would be less equipped. The waived payments are a matter of policy. Israel should argue that the increasing needs require keeping this policy in spite of the growing self-sufficiency, which can hardly keep up with the arms race. By itself, Israel should prepare for the worst case of changing the financing policy with or without connection to the self-sufficiency issue. This, for sure, favors the domestic production of AFA.

The credit financing, although convenient and, in fact, even vital in the short run, has severe implications in the long run. In the Israeli 1981 budget proposal, 30% of the total expenditures are debt payments. This percentage had an increasing trend through the 1970's, although slightly decreased from 1980 to 1981. Debt payments in foreign currency for FY 1981/82 amounts to nearly \$2 billion, about twice as the total FMS agreements projected to this year. About \$540 million of that huge debt are attributed to the FMS Financing Program annual payment [247].

The above figures emphasize what a heavy debt burden lies on the Israeli economy. While some economists argue that there is nothing wrong with a government's debt to its own citizens, this is not the case when foreign debt is concerned. Here the economic consequences are accompanied by political ones. Cahn [248] argues that transactions such as credit sales, which stretch over several years, provide multiple leverage points.

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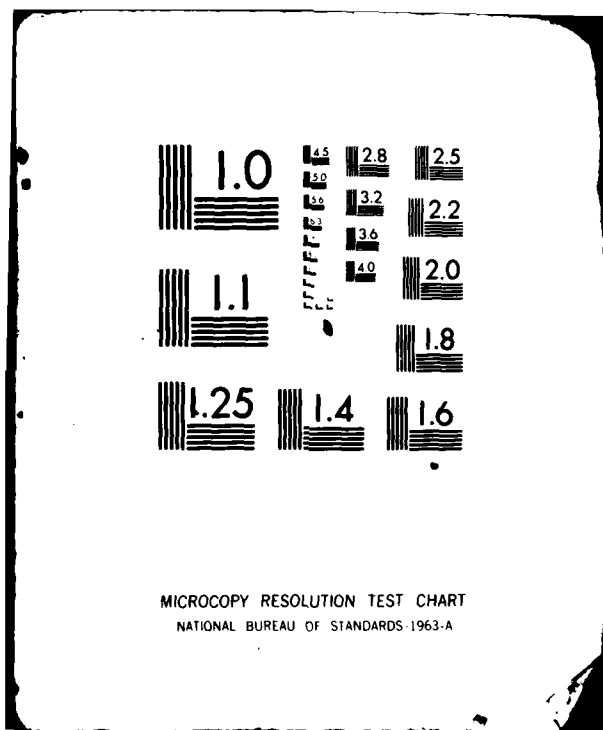
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Thus, in the Israeli circumstances, decreasing or even stagnating the national foreign debt is a crucial task. AFA domestic production can save large dollar expenditures, as a result of being an extremely expensive commodity.

The second subject to examine is the export contribution to the balance of payments. In terms of balance of payments only, exports always contribute positively. But the question of export profitability should be asked in a broader sense: is it economically profitable, i.e., cover costs and even earn some profit? In other words, does the competition require such a low price that it is not justifiable to export any more?

According to Goldstein [249] some potential Third World arms exporters may find it economically justifiable to export arms even when sales are not, in a narrow sense, profitable. In such cases exports are made in order to earn foreign hard currency; demonstrate a level of technological sophistication; gain access to another country's market for these or other products, or to gain a political benefit.

All the above arguments may apply to the Israeli AFA case as well. On the other hand, in its hard-pressed economic situation, Israel should strive to be profitable in the narrow sense also. In this respect Israel has some advantages which results in a competitive low price for its AFA in the international market:

- Israel has low labor costs: cost of labor in development in Israel is about half of the equivalent American hourly rate [250]. Cost of production or maintenance labor is about two-thirds of the equivalent labor in the U.S. or Europe [251].

- Israel can exploit to the maximum the technology transfer opportunities: it can leap-frog some of the earlier stages of technology, allowing the more advanced states in technology to underwrite the R&D costs, while learning from their achievement and mistakes [252]. Thus, the Lavi R&D costs are estimated as one-half to one-third of its contemporaries in the U.S. and Europe.

- The large amounts consumed domestically (even in European terms) enable Israel lower export unit prices. (This effect, of course, is a two-way street between exports and domestic consumption.)

The prospect of the new Israeli AFA exports has already been discussed in Chapter VI. In short, they are very vague and wander somewhere between the great boom of the general arms exports and the flop (so far) of the Kfir export attempts. As explained in Chapter V, the domestic consumption of the Lavi is likely to be large enough to justify the indigenous production anyway. (This is, of course, under the assumption that the expected costs would not overrun or be out of control.) Thus, exports in this case may be considered as a bonus rather than as a condition for the industry to survive. As a consequence, the first contribution to balance of payments, i.e., foreign currency savings, is supposed to be thoroughly accomplished by the AFA indigenous production. The second contribution of earning hard currency by exports is still unknown, but if it occurs, it can be accepted favorably as a significant bonus.

3. The Inflationary Effect of the AFA Production

a. Overview

Perhaps the worst illness of the Israeli economy in recent years has been inflation. It has reached peaks of three digit figures such as 120%-130% at an annual rate. The near term goal of the current government is to reduce inflation below the 100% annual rate. The main reasons for such a tremendous rate are:

- High defense expenditures.
- The rise in the world's oil prices.
- Wrong allocation of the labor force between the productive sector and the public services, and low productivity of labor.
- Fast economic growth rate (although significantly reduced in recent years).

One can also argue about the extent to which various government decisions have accelerated or diminished the rate of inflation. In any case, it is clear that a major step to counter inflation is to reduce the real activities in the state budget [253].

b. The Defense Expenditures in Israel

As mentioned before, the defense budget as a major government expenditure, is one of the reasons for inflation. In the 1981 budget, it counts for 31% of the total budget [254]. This percentage has been stable in the late 1970's and early 1980's, after a high of 49% in 1973 (the war year) [255]. As such, Israel in 1978 was in fifth place in the world in the ranking order of military expenditures as a percentage of the central government total expenditures [256].

The military expenditures as a percentage of the total Israeli GNP stabilized in recent years at around 25% [257], compared to 5.4%, 5.3% and 5.5% for the world totals, developed and developing countries, respectively [258].

The effect of the defense budgets components is not uniform. As previously mentioned, about half of the defense budget is the American Security Assistance Program. This money is spent for the most part in the U.S., for U.S. goods purchases. Only 1/8 of it is not bound to specific purchases in the U.S. Thus, the U.S. security aid does not increase the Israeli money supply, and does not affect inflation significantly.

What does affect inflation is the part of the defense budget which is aimed at local spending. This part counts for about 13%-14% of the GNP [259], which is still more than two-fold of the world's average percentage. No wonder this part of the defense budget has been targeted for cuts involving hard debates between the treasury and the defense establishment. The debate even caused the retirement of the Minister of Defense, Ezer Weizman as a protest, after a large chopping of the defense budget.

This lengthy description is to emphasize in what environment the Lavi decision has been taken, since its funding comes mostly from the local spending part of the defense budget.

c. The Inflation Consideration in the Lavi Decision

It is now clear that a flow of about \$1 billion through the next 8 years [260] for the Lavi development with returns only starting, hopefully, in 1988, may result in several outcomes, alternatively or simultaneously:

- Severe cuts in any other expenditures in the "Shekels" defense budget, in order to finance Lavi development. As a consequence, vital security needs can be severely hurt.

- Insufficient financing of the Lavi development and by that causing, presumably, delays or even inadequate design results.

- Increasing the budget by "printing" money or otherwise, and by that inflaming the hyperinflation.

With this background one can understand the demands of some senior military officers to cancel the project [261], or from the industry side to mobilize funding through collaborations or exchange of the U.S. aid into Israeli "shekels".

Buying American-made aircraft only, apparently frees Israel from the painful selection between the above-mentioned all-bad alternatives.

Thus, the budgeting problem and the inflationary effect represent the most acute problems for the Israeli AFA .

4. Technological and Industrial Base Implications and the Spin-off Effect

a. Overview

Arms industries in the Third World countries are often viewed as leading the way in a country's effort to further its industrialization [262]. In fact, even in the developed countries, the arms industries and their derivatives (e.g., space research) lead the technological advance and the innovative research. Arms industries not only contribute to the technological know-how of a country, but they require and thus maintain a wide industrial base.

Arms industries in many cases contribute to the general commercial industry of a country by the spin-off effect. The technology innovated for arms is used in commercial products. Military sales may promote sales in the commercial arena [263]. All these phenomena strongly exist in the Israeli realm, and serve as a driving motive for indigenous arms industry in general, and AFA production in particular.

b. AFA Effect on Technological Advance and Industrial Base in Israel

Several commentators in the Israeli press emphasize the tremendous contribution of the aeronautical industry to the Israeli general technological capability [264]. It has already been mentioned that the IAI with its 22,000 workers is the largest single plant in Israel. Its 2000 engineers are the largest design group in the country. No further illustrations are needed to understand what portion of the Israeli industrial infrastructure IAI and its subsidiaries take.

AFA development and production in Israel will give a great push to the technological advance and the industrial base of the country. Substitution of AFA production by less demanding arms (e.g., small and medium range missiles, electronics, etc.) would not provide the same scale, and thus, from this respect would be less effective. Coproduction or any other way of collaboration with large American firms might occupy the production lines, but leave the domestic design force with much fewer challenges (since, naturally, most of the design would be done in the sponsoring company).

c. AFA Production's Spin-off Effect

The spin-off effects work both in the technological and sales areas.

The technological spin-off is very straightforward within the aeronautical industry itself, where it is a two-way street between the military and the civilian products. In 1976 Mr. Shimon Peres, at that time the Minister of Defense, said that the investments in the civilian models of the Arava and the Westwind had helped in production of the Kfir [265]. But it also worked in the reverse way.

With respect to the sales' spin-off, Lorbar [266] says that the reputation of the Kfir (though not yet exported) and the sales of the Gabriel missile, assisted the sale of Israeli-made electronic medicine devices (area in which Israel is one of the world leaders).

Thus, this aspect clearly favors the domestic production of the Israeli AFA.

5. Labor Force and Employment Implications

a. Overview

According to Cahn [267], the conventional arms industry employs between 1 to 1.5 percent of the working population in the major West European arms-supplying countries. In Israel, this percentage is much higher. According to one source, the production of the new Israeli AFA would create a situation in which every tenth worker in the industry would be connected directly or indirectly with the aerospace industry [268]. Even today, the 22,000 workers of the IAI and the additional 5000

in its subsidiaries, count for a large portion of the industrial labor force in Israel.

In Israel, more than in many other countries, the creation and the expansion of the aerospace industries has not been driven by the need to provide employment. For more than a decade Israel had enjoyed full employment. But once the industry had been developed, and jobs had been created, it achieved its own momentum. Such a huge labor force employed in this industry is not flexible enough to be transferred to other sectors. And no government can ignore its responsibility to provide projects to keep this labor force working. This is even more so when the industry is government-owned as in Israel and in most European states.

b. Employment and Social Rights

In the Israeli social environment, workers are highly secured against dismissal, by formal rights and by the general power of the trade unions. It is also a primary commitment of the government to prevent unemployment. Consequently, Lorbar [269] argues that what happened in the U.S. between 1968-1972 in the aerospace industry cannot take place in the Israeli reality. According to Lorbar, as a result of an ebb in the U.S. aerospace industry, 90,000 workers were fired. As a ramification of this huge firing, a total number of 220,000 employees lost their jobs in that period. These firings saved the firms about \$7.5 billion. Such a thing (of course on a relative scale) is very unlikely to happen in Israel.

The Indian example is more compatible with the Israeli environment. When HAL terminates a particular program, workers

are shifted to other projects rather than laid off, despite the uneconomical nature of the practice. According to Air Marshal S.J. Dasture [270], HAL Chairman, "You have to be pretty desperate to lay off workers in a public sector organization".

In fact, the labor force considerations have been the crucial ingredient in the Swedish government's decision to go ahead with the B-3LA program [271].

Not to undertake the Lavi project would mean wide dismissal, or what is more likely, keeping over-capacity workers on smaller projects. In the latter case, the labor costs, which are 60%-80% of a modern weapon system R&D costs, would be incurred anyway, and the relief to the sagging defense budget would not be as significant as expected [272].

c. The Effect of AFA's Decision on Skilled Manpower

By its nature, AFA development and production involves relatively high concentrations of skilled manpower--engineers, technicians and management personnel. Such skilled labor, temporarily released, may be lost forever [273]. Moreover, the IAI expressed its fear of "brain flight", i.e., engineers emigrating to other countries--something which is perceived very severely in the Israeli environment.

In this respect, coproduction is not enough. As stated by an Israeli key military planner [274], "We have a very solid offset production-wise on the F-15--but not for engineers. The interests of the Israeli aerospace industry are not only economics. Our industry has good engineers who need challenges in development and research". No doubt that indigenous AFA

can provide R&D challenges on a higher level and larger scale than any other project.

6. Some Economic "Awkward Problems"

a. General

Several "awkward problems" with respect to the indigenous AFA are raised in the general literature, which apply to the Israeli case. They are presented in the following paragraphs.

b. "All the Eggs in One Basket"

Some authors warn about the risk in allocating such a large portion of the national resources--budgets, manpower, industrial base--to one single industry [275]. They found some parallel characteristics in that sense between Israel and Washington State in the U.S. In Washington, with a population of 3.5 million (a little less than Israel as a whole), 50,000 people work in the Boeing Corporation. The feeling in that state is that the fate of the state highly depends on the status of Boeing. But, the "only" difference is that behind Washington State still stands the federal government of the most powerful country in the world to compensate downturns in the aerospace industry. This is not the case with Israel (although one can joke that the same federal government stands behind Israel too...).

A sudden cut in IAI production may cause a collapse of the whole Israeli economy. These authors emphasize the great fluctuations of the arms market because of rapid innovations in technology; economic tides and ebbs; political changes and the tendency of governments to procure such weapons as aircraft from particular firms in a short two-or-three year period, every

ten years or so [276]. The Israeli market is especially sensitive to such fluctuations because of its limited selection of potential customers.

No doubt that these fears are real and are of great concern to the decision-makers. On the other hand, in the aerospace industry, as explained in Chapter III, if the risks are high, so are the opportunities.

The "insurance" against market fluctuations in the Israeli case is the large domestic consumption, which is unfortunately, determined by the circumstances.

c. The Burden on the Economy

Another claim against indigenous arms industries is that those industries place burdens on their countries' economies and result in the diversion of scarce resources from badly-needed economic and social development [277]. The question accompanying this claim is usually, "what could have been the shape of the national economy if all these resources would have been invested in commercial products and services, rather than in the arms industry?" As an example, usually raised is the Japanese example--how a nation freed from high defense burdens (as a result of World War II) could use its resources to develop tremendously successful industries. Moreover, to contradict the assumption that arms exports bring about a spin-off effect of increasing commercial sales to the same customers, the Japanese example is brought up again. Since the fourfold oil price increase in 1973, Japan's total exports showed the largest increase--82%, compared to increases of 51% to 61% for the other

leading Western nations. Yet for the same period, Japan's negligible arms exports actually declined from \$17 million in 1973 to \$8 million in 1976. A similar picture is seen in examining the West German exports to OPEC countries (although in that case arms sales increased too, but at a much slower pace) [278]. In return, one can argue that Japan and West Germany are special phenomena in the industrial world. Also, the above example does not suggest that the spin-off effect does not work for those who do supply arms.

In any case, for the Israeli case the answer is clear. Here, arms are not just an easy way to make economic profits, but an essential need. Resources should be allocated to arms purchases anyway. There are authors who think that "in developing countries, U.S. arms aid and purchases could have harmful economic consequences" [279], since it saps the limited financial resources of the recipient that could be better spent furthering the economic development of that society [280]. Thus, both alternatives facing Israel absorb large resources and may harm its economy. Buying outside is more convenient in the short run, but creates long run debt burdens. Producing domestically squeezes the short run resources, but is promising in the long run. There is no third alternative in the Israeli circumstances, thus, the Japanese example just is not valid for Israel.

7. Concluding Comments

Indigenous production of AFA in Israel has been found favorable for the economy from most aspects:

- It contributes to favorable balance-of-payments by saving foreign currency spendings, and potentially, by earning such currency through exports.

- It expands and advances the technological base and industrial infrastructure of the country.

- It has positive spin-off effects on commercial products, technology and sales.

- It provides employment, keeps in existence the largest industry Israel possesses, and prevents "brain flight" and loss of skilled manpower.

- The large domestic market is insurance against the world market fluctuations.

The paramount obstacle to the project is the Israeli hyperinflation. The project may inflame the inflation or, in exchange, not obtain adequate funds and, thus, lag or even fail (or be canceled).

It is this problem the Israeli policy-makers have to cope with in order to proceed with the Lavi program, or in any future similar program, at least in the next decade.^a Actually, that is what the current "debate on the Lavi" is all about, and presumably that will be the case in the coming years.

^aThe author of this paper feels that it is beyond his scope, capabilities and data available to suggest concrete suggestions on how to cope with the above problem. He views his task as enabling the reader to focus on the acute issues.

X. CONCLUSION

The past performance and the current capabilities of the IAI provide solid proof of its ability to cope with the challenge of development and production of advanced fighter aircraft (AFA). From the industry viewpoint, it has been rational to define its future aircraft as relatively unsophisticated, not pretending to be state-of-the art. Moreover, such a type of aircraft will be needed in large amounts in the IAF by the 1990's.

But the Israeli AFA does not free the IAF from acquiring American advanced fighters in the foreseeable future. This fact is only one component in the long term dependence of Israel on the U.S., stemming from the Middle East conflict. This dependence, or one can say--relationship--is implemented in terms of political support, financial assistance, arms supply, and aid in crisis time. The degree of that long term dependence can be changed by two major developments:

- Calming the Mid-East conflict.
- Securing the American commitment by more formal alliance.

The indigenous arms industry, including an AFA production, does not much affect Israel's long term dependence. On the other hand, Israel has a great extent of short run political freedom, enabled by U.S. limits of leverage, and the reverse leverage of Israel over the U.S. The short run independence can be significantly strengthened by the indigenous arms production.

But since Israel is still far from being completely self-sufficient, it is not bound in its selection of what weapons to develop and produce. From the Israeli-U.S. relationship angle, the AFA does not necessarily have the greatest impact on the short run independence, since it still requires American engines, and since other aircraft should be purchased from the U.S., anyway. Thus, although indigenous AFA does contribute to the Israeli political flexibility, it is not necessarily the preferred product to concentrate on as a result of this aspect. That conclusion slightly weakens the political motive of the indigenous AFA, although the political motive for indigenous arms industry as a whole is as strong and solid as ever.

The above analysis shifts the weight in the decision-making to the economic area. In the economic area almost all factors are in favor of the domestic production of the AFA:

- It contributes favorably to the balance of payments, even without being exported.
- It expands and enhances the technological base and the industrial infrastructure.
- It has positive spin-off effect on commercial industry.
- It provides employment, and maintains a concentration of skilled labor.

The major weakness of the indigenous AFA is its inflationary effect. An effort should be made to cope with this weakness. Even an increase in short run political dependence by using U.S. aid funds for the project, or collaboration with U.S. firms are desirable. It is justified to undertake short term liabilities

in order to acquire long term assets. The employment of the workers as well as the deployment facilities in the already existing aeronautical industry is a crucial consideration. Exports are not a matter of survivability in the indigenous AFA case.

This paper analyzed a variety of areas and factors affecting the decision. All of them should be considered, but by no means with equal weight for the decision. An attempt to rank factors may lead to the following "rough" conclusions:

- The technical capability has the lowest impact on the decision. Since the Israeli industry is safely above the required minimum capability for such a project, it does not matter so much how this capability is related to the major world's aircraft producers.

- The political aspects are less important than people tend to think since the AFA does not change significantly the existing long run dependence, and short-run political freedom exists anyway. It may contribute to the short run flexibility, but other indigenous arms instead (while all aircraft are imported) may do as well. The prestige effect--external and internal--have relatively minor impact on the decision.

- The greatest weight is attributed to the economic category. Balance of payments, inflation and employment are the most important with respect to the subject under discussion. The critical issue is the inflation or in exchange--the funds available to the program. Being under the threshold in this area may cause the whole program to fail.

So this is the area to be emphasized in any decision-making about an Israeli AFA in the next decade. Issues like political independence, export opportunities or difficulties, and others which are used to support or contradict the indigenous AFA, may get less weight than they are actually given, though they should not be ignored.

The bottom line is: Israel should undertake the demanding commitment of indigenous AFA, unless it views no way to provide the adequate funds through the development phase. The assumption is that this question has been assessed thoroughly before the decision about the Lavi has been made. But it will continue to be the crucial one at any future milestone, or in a decision about another Israeli AFA initiation some 5, 8 or 10 years ahead.

One final comment: From a practical viewpoint, one can argue that this paper attempts to analyze considerations for a decision, while the decision has been already made. According to this approach the circumstances underlying the analysis are good only for this case's timeframe, so it can be used in a best case as a posterior assessment of the decision. But in fact, a major acquisition decision is not of a "one shot" type. Through the many years of the acquisition cycle, on milestones and between them, there are several iterations of the decision. In addition, within the acquisition cycle of one aircraft, the new one starts to roll on. That can happen--and not too late to make this analysis completely obsolete. Thus, beyond the "academic" interpretation of the past decision, which is important for its own right, this paper might have, perhaps, some practical applications for future decisions as well.

APPENDIX A

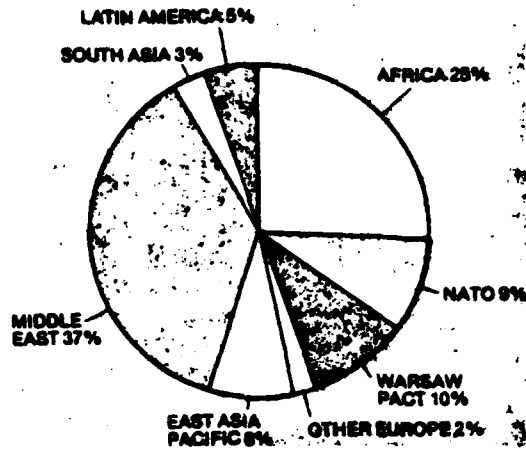
Arms Imports and Exports

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Comment: The tables consist of sample countries only. For complete details, see the source.

Source: ACDA, World Military Expenditures and Arms Transfers [47]

World Arms Imports, 1978
Shares by Regions



World Arms Imports

\$BILLIONS (constant '77)

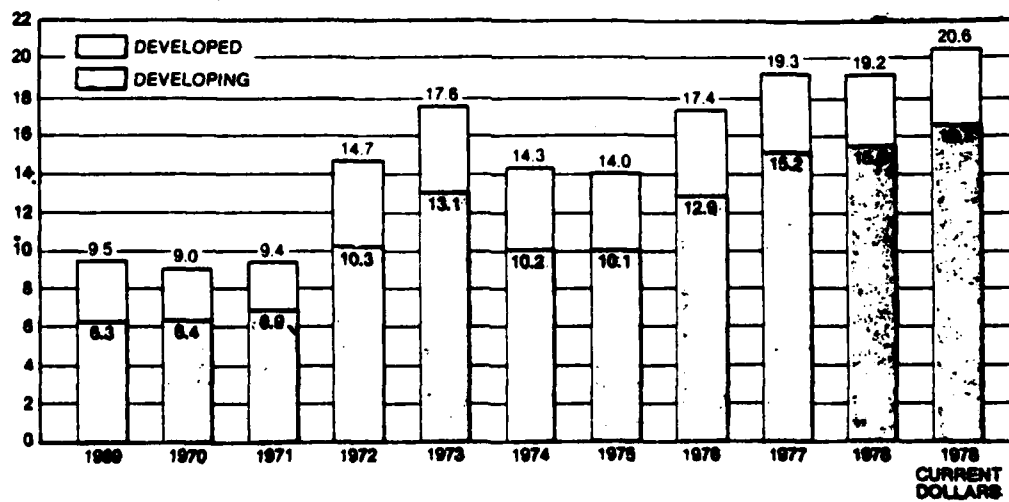


Table A. Value of Arms Exports: 1969-1978
(In millions of constant 1977 dollars)

	Total Global Arms Exports	Developing World Arms Exports*	% of Global Exports	Developing World Arms Exports exc. PRC	% of Global Exports
1969	9519	276	2.9%	49	.51%
1970	9036	370	4.1%	62	.69%
1971	9362	404	4.3%	37	.40%
1972	14680	1256	8.6%	57	.39%
1973	17625	427	2.4%	120	.68%
1974	14334	378	2.6%	208	1.5%
1975	14029	701	5.0%	501	3.6%
1976	17352	952	5.5%	804	4.6%
1977	19300	750	3.9%	640	3.3%
1978	19177	837	4.4%	707	3.7%
Total:	144414	6351	4.4%	3185	2.2%

*Including the People's Republic of China

Sources: U.S. Arms Control and Disarmament Agency: *World Military Expenditures and Arms Transfers 1969-1978*

Leading Countries in Arms Imports, 1978

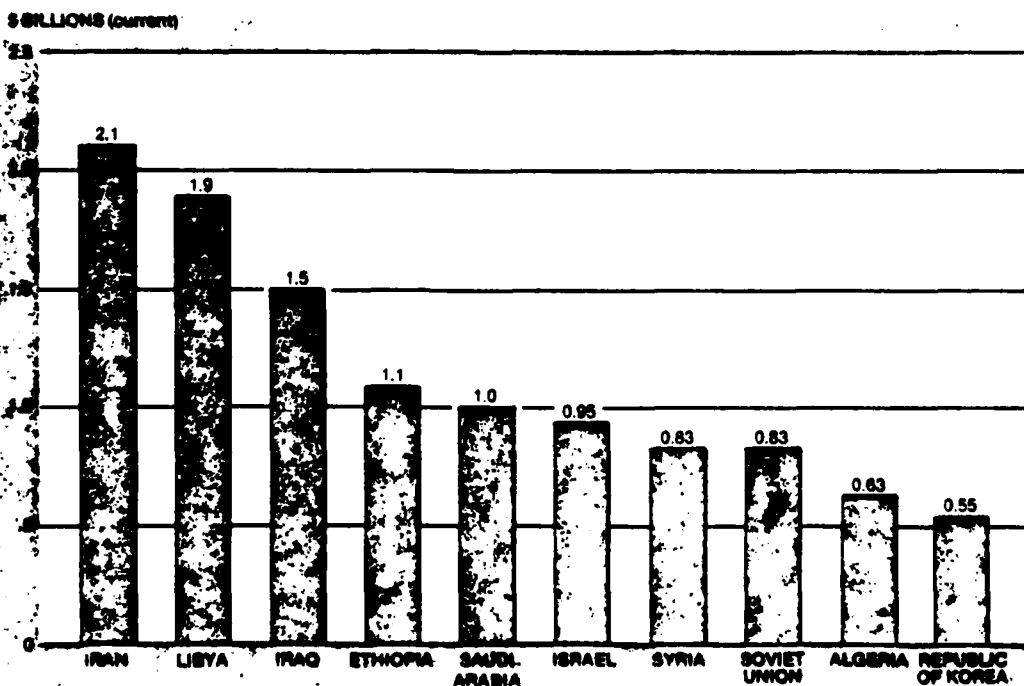


TABLE I. Military Expenditures, GNP, Central Government Expenditures, Public Health Expenditures, and Public Education Expenditures, 1969-1978, By Region, Organization, and Country

YEAR	MILITARY EXPENDITURES (MILEX)		GROSS NATIONAL PRODUCT (GNP)		CENTRAL GOVERNMENT EXPENDITURES (CGE)	PUBLIC HEALTH EXPENDITURES (H)	PUBLIC EDUCATION EXPENDITURES (E)	MILEX / GNP	MILEX / H	H / GNP	E / GNP	H + E / MILEX
	Billion dollars ^a		Billion dollars ^a									
	Current	Constant 1977	Current	Constant 1977	Billion Constant 1977 dollars							
WORLD TOTALS												
1969	236.0	383.4	3537	5746	1145.4	120.6	275.5	6.7	33.5	2.1	4.8	103
1970	247.5	382.3	3912	6043	1208.5	139.0	293.0	6.3	31.6	2.3	4.8	113
1971	259.8	381.8	4293	6310	1288.0	154.3	315.2	6.1	29.6	2.4	5.0	123
1972	278.7	393.4	4704	6641	1364.2	167.6	323.0	5.9	28.8	2.5	4.9	124
1973	301.2	402.1	5314	7095	1428.3	177.3	350.9	5.7	28.2	2.5	4.9	131
1974	339.5	414.2	5951	7259	1468.2	191.5	359.5	5.7	28.2	2.6	5.0	133
1975	383.0	426.5	6599	7348	1708.0	211.6	381.8	5.8	25.0	2.9	5.2	139
1976	411.5	435.4	7284	7707	1785.2	224.7	408.7	5.6	24.4	2.9	5.3	145
1977	439.1	439.1	8010	8010	1863.4	237.0	427.0	5.5	23.6	3.0	5.3	151
1978	479.9	446.7	8967	8348	1991.0	253.5	441.1	5.4	22.4	3.0	5.3	155
DEVELOPED												
1969	197.3	320.4	2892	4698	940.5	108.3	241.1	6.8	34.1	2.3	5.1	109
1970	202.2	312.4	3172	4900	985.7	125.7	255.0	6.4	31.7	2.6	5.2	121
1971	209.8	308.4	3464	5091	1033.3	139.7	272.7	6.1	29.8	2.7	5.4	133
1972	224.0	316.2	3783	5340	1083.1	151.6	275.7	5.9	29.2	2.8	5.2	135
1973	238.5	318.5	4248	5672	1119.6	159.9	300.9	5.6	28.4	2.8	5.3	144
1974	268.2	327.2	4717	5754	1130.6	173.9	309.6	5.7	28.9	3.0	5.4	147
1975	295.4	328.9	5172	5759	1308.9	192.4	323.5	5.7	25.1	3.3	5.6	156
1976	314.0	332.2	5712	6043	1365.2	204.6	346.9	5.5	24.3	3.4	5.7	166
1977	339.3	339.3	6256	6256	1425.6	216.1	362.7	5.4	23.8	3.5	5.8	170
1978	370.3	344.7	6971	6490	1528.7	231.0	374.2	5.3	22.5	3.6	5.8	175
DEVELOPING												
1969	38.8	63.0	645	1048	205.0	12.3	34.5	6.0	30.7	1.2	3.3	74
1970	45.2	69.9	740	1143	222.7	13.3	38.0	6.1	31.4	1.2	3.3	73
1971	50.0	73.4	829	1219	254.7	14.5	42.5	6.0	28.8	1.2	3.5	77
1972	54.7	77.2	921	1301	281.1	16.0	47.3	5.9	27.5	1.2	3.6	82
1973	62.6	83.6	1066	1423	308.7	17.5	50.0	5.9	27.1	1.2	3.5	80
1974	71.3	87.0	1233	1505	337.6	17.6	49.9	5.8	25.8	1.2	3.3	77
1975	87.6	97.6	1427	1589	399.1	19.2	58.3	6.1	24.5	1.2	3.7	79
1976	97.6	103.2	1572	1663	420.0	20.1	61.8	6.2	24.6	1.2	3.7	79
1977	99.8	99.8	1754	1754	437.9	21.0	64.3	5.7	22.8	1.2	3.7	85
1978	109.6	102.0	1996	1858	462.2	22.5	67.0	5.5	22.1	1.2	3.6	87

TABLE I

TABLE I. Military Expenditures, GNP, Central Government Expenditures, Public Health Expenditures, and Public Education Expenditures, 1968-1978, By Region, Organization, and Country - continued

Year	Military Expenditures (billion \$)		GROSS NATIONAL PRODUCT (GNP)		CENTRAL GOVERNMENT EXPENDITURES (billion \$)	PUBLIC HEALTH EXPENDITURES (billion \$)	PUBLIC EDUCATION EXPENDITURES (billion \$)	MILITARY GNP (%)	MILITARY GNP (%)	GNP (%)	GNP (%)	GNP (%)			
	billion dollars ^a		billion dollars ^a										billion constant 1977 dollars		
	Current	Constant 1977	Current	Constant 1977											
ISRAEL															
1969	1196	1943	5883	9558	4631	182	494	20.3	42.0	1.9	5.2	34			
1970	1663	2569	6620	10226	5393	203	563	25.1	47.6	2.0	5.5	29			
1971	1752	2575	7707	11327	6118	211	676	22.7	42.1	1.9	6.0	34			
1972	1721	2430	9026	12741	6741	262	762	19.1	36.0	2.1	6.0	42			
1973	3768	5032	9918	13243	9577	408	887	38.0	52.5	3.1	6.7	25			
1974	3287	4010	11535	14072	9267	506	964	28.5	43.3	3.6	6.9	36			
1975	4111	4577	12973	14445	10572	527	985	31.7	43.3	3.6	6.8	33			
1976	4424	4681	13521	14307	11418	511 g	938 c	32.7	41.0	3.6	6.6	31			
1977	4312	4312	14341	14341	12381	670 g	1213 c	30.1	34.8	4.7	8.5	43			
1978	3914	3643	16123	15010	11128	NA	NA	24.3	32.7	NA	NA	NA			
FRANCE															
1969	7391	12008	169674	275633	61319	NA	12820	4.4	19.6	NA	4.7				
1970	7832	12099	188652	291409	61548	NA	14215	4.2	19.7	NA	4.9				
1971	8316	12222	209081	307295	64305	NA	15413	4.0	19.0	NA	5.0				
1972	8874	12526	230109	324812	65648	10551	16042	3.9	19.1	3.2	4.9				
1973	9687	12935	255967	341773	68131	NA	18445	3.8	19.0	NA	5.4				
1974	10803	13179	289538	353216	75906	NA	17061 d	3.7	17.4	NA	4.8				
1975	12209	13594	317928	353993	82375	19681	19580	3.8	16.5	5.6	5.5				
1976	13362	14138	350279	370621	80403	20445	21395	3.8	17.6	5.5	5.8				
1977	14965	14965	382138	382138	83093	NA	22011	3.9	18.0	NA	5.8				
1978	16587	15442	422852	393655	84873	NA	NA	3.9	18.2	NA	NA				
UNITED STATES															
1969	81443	132303	938800	1525066	299717	f 39799	k 96656	8.7	44.1	2.6	6.3	103			
1970	77854	120260	985800	1522749	303684	42169	99786	7.9	39.6	2.8	6.6	118			
1971	74862	110028	1067700	1569244	310703	46149	104058	7.0	35.4	2.9	6.6	136			
1972	77639	109592	1175400	1659145	327481	49404	106008	6.6	33.5	3.0	6.4	141			
1973	78358	104625	1311200	1750745	329933	51806	115630	6.0	31.7	3.0	6.6	160			
1974	85906	104799	1419800	1732054	276435	56848	111379	6.1	37.9	3.3	6.4	160			
1975	90948	101265	1537000	1711355	363092	62018	112123	5.9	27.9	3.6	6.6	172			
1976	91013	96298	1709400	1808670	386831	65918	117128	5.3	24.9	3.6	6.5	190			
1977	100928	100928	1896100	1896100	401900	69300	120700	5.3	25.1	3.7	6.4	188			
1978	108357	100875	2117700	1971480	419673	72707	119162	5.1	24.0	3.7	6.0	190			
SWEDEN															
1969	1536	2496	42132	68443	20398	3005	5513	3.6	12.2	4.4	8.1	3			
1970	1681	2597	46675	72098	21139	3390	5553	3.6	12.3	4.7	7.7	3			
1971	1798	2642	48911	71887	22303	3790	5735	3.7	11.8	5.3	8.0	3			
1972	1909	2695	51763	73067	NA	3996	5791	3.7	NA	5.5	7.9	3			
1973	2021	2699	56621	75602	18793	4020	5827	3.6	14.4	5.3	7.7	3			
1974	2247	2741	64482	78663	21699	4449	5837	3.5	12.6	5.7	7.4	3			
1975	2424	2699	71120	79188	23185	4780	5859	3.4	11.6	6.0	7.4	3			
1976	2532	2680	75638	80030	25007	4962	6198	3.3	10.7	6.2	7.7	4			
1977	2668	2668	77760	77760	25716	4610 g	6561	3.4	10.4	5.9	8.4	4			
1978	2932	2730	85373	79478	28119	4960 g	6840 c	3.4	9.7	6.2	8.6	4			
SYRIA															
1969	227	370	2247	3651	1009	NA	144	10.1	36.7	NA	4.0				
1970	282	436	2417	3734	1160	NA	149	11.7	37.6	NA	4.0				
1971	249	367	2779	4085	1260	23	155	9.0	29.1	0.6	3.8				
1972	280	396	3225	4553	1334	18	165	8.7	29.7	0.4	3.6				
1973	536	716	3478	4644	1612	11	175	15.4	44.5	0.2	3.8				
1974	499	609	4513	5506	2019	13	180	11.1	30.2	0.2	3.3				
1975	924	1029	5585	6219	3036	25	255	16.6	33.9	0.4	4.1				
1976	965	1022	6311	6678	3164	34	405	15.3	32.3	0.5	6.1				
1977	1047	1047	6717	6717	3284	29	209 c	15.6	31.9	0.4	3.1				
1978	1176	1095	7503	6985	3076	NA	NA	15.7	35.6	NA	NA				

**TABLE II. Armed Forces, Population, Physicians, and Teachers, 1969-1978,
By Region, Organization, and Country**

YEAR	PEOPLE Million	ARMED FORCES Thousands	TEACHERS ^a Thousands	PHYSICIANS Thousands	ARMED FORCES PER 100 PEOPLE	TEACHERS PER 100 PEOPLE	PHYSICIANS PER 100 PEOPLE	TEACHERS ARMED FORCES	PHYSICIANS ARMED FORCES	GNP PER CAPITA 1977 Constant dollars	MEX PER CAPITA 1977 Constant dollars
WORLD TOTALS											
1969	3552.6	24830	22284	2400.8	7.0	6.3	0.7	89.7	9.7	1617	107
1970	3625.9	24916	23452	2500.9	6.9	6.5	0.7	94.1	10.0	1666	105
1971	3697.7	25441	24340	2636.2	6.9	6.6	0.7	95.7	10.4	1706	103
1972	3845.5	25697	25499	2718.1	6.7	6.6	0.7	99.2	10.6	1726	102
1973	3921.7	26077	26386	2820.8	6.6	6.7	0.7	101.2	10.8	1809	102
1974	3999.6	27287	27320	2964.9	6.8	6.8	0.7	100.1	10.9	1815	103
1975	4089.7	26447	28489	3022.5	6.5	7.0	0.7	107.7	11.4	1796	104
1976	4169.5	26297	29136	3263.3	6.3	7.0	0.8	110.8	12.4	1848	104
1977	4247.6	26259	29709	3388.0	6.2	7.0	0.8	113.1	12.9	1885	103
1978	4314.9	26639	29898	3471.6	6.2	6.9	0.8	112.2	13.0	1934	103
DEVELOPED											
1969	988.6	11830	11391	1598.5	12.0	11.5	1.6	96.3	13.5	4752	324
1970	997.1	11565	11668	1649.9	11.6	11.7	1.7	100.9	14.3	4914	313
1971	1006.4	11332	11927	1753.5	11.3	11.9	1.7	105.3	15.5	5059	306
1972	1015.0	11033	12160	1791.1	10.9	12.0	1.8	110.2	16.2	5261	311
1973	1024.2	11003	12491	1848.5	10.7	12.2	1.8	113.5	16.8	5538	311
1974	1032.6	10987	12748	1974.2	10.6	12.3	1.9	116.0	18.0	5573	316
1975	1041.0	10983	13041	1999.6	10.6	12.5	1.9	118.7	18.2	5532	315
1976	1048.4	10731	13426	2172.1	10.2	12.8	2.1	125.1	20.2	5764	316
1977	1055.8	10633	13947	2246.3	10.1	13.2	2.1	131.2	21.1	5925	321
1978	1063.0	10755	14448	2275.8	10.1	13.6	2.1	134.3	21.2	6105	324
DEVELOPING											
1969	2564.0	13000	10892	802.3	5.1	4.2	0.3	83.8	6.2	408	24
1970	2628.8	13351	11784	851.0	5.1	4.5	0.3	88.3	6.4	435	26
1971	2691.3	14109	12412	882.7	5.2	4.6	0.3	88.0	6.3	453	27
1972	2830.5	14664	13338	927.0	5.2	4.7	0.3	91.0	6.3	459	27
1973	2897.5	15074	13894	972.3	5.2	4.8	0.3	92.2	6.4	491	28
1974	2967.0	16300	14571	990.7	5.5	4.9	0.3	89.4	6.1	507	29
1975	3048.7	15464	15448	1022.9	5.1	5.1	0.3	99.9	6.6	521	32
1976	3121.1	15566	15710	1091.2	5.0	5.0	0.3	100.9	7.0	533	33
1977	3181.8	15626	15761	1141.7	4.9	4.9	0.4	100.9	7.3	549	31
1978	3251.9	15884	15449	1195.8	4.9	4.8	0.4	97.3	7.5	571	31

TABLE II

TABLE II. Armed Forces, Population, Physicians, and Teachers, 1969-1978,
By Region, Organization, and Country - continued

YEAR	PEOPLE Million	ARMED FORCES Thousand	TEACHERS ^a Thousand	PHYSICIANS Thousand	ARMED FORCES PER 1000 PEOPLE	TEACHERS PER 1000 PEOPLE	PHYSICIANS PER 1000 PEOPLE	TEACHERS PER 1000 PEOPLE	PHYSICIANS PER 1000 PEOPLE	GNP PER CAPITA 1977 Constant dollars	MILE ^b PER CAPITA 1977 Constant dollars
ISRAEL											
1969	2.9	100	g	f	34.5	14.8	2.4	43.0	6.9	3296	670
1970	3.0	105	43	7.3	35.0	15.3	2.4	43.8	7.0	3408	856
1971	3.1	130	47	7.7	41.9	15.2	2.5	36.2	5.9	3654	830
1972	3.2	130	51	8.5	40.6	15.9	2.7	39.2	6.5	3981	759
1973	3.3	130	58	9.1	39.4	17.6	2.8	44.6	7.0	4013	1525
1974	3.4	160	49	NA	47.1	14.4	NA	30.6	NA	4138	1179
1975	3.5	190	54	NA	54.3	15.4	NA	28.4	NA	4127	1308
1976	3.5	190	57	NA	54.3	16.3	NA	30.0	NA	4087	1337
1977	3.6	165	59	2.0	45.8	16.4	0.6	35.8	1.2	3983	1197
1978	3.7	165	NA	NA	44.6	NA	NA	NA	NA	4056	984
SWEDEN											
1969	8.0	75	g,1	10.4	9.4	10.0	1.3	106.7	13.9	8555	3
1970	8.0	75	80	11.0	9.4	10.8	1.4	114.7	14.7	9012	3
1971	8.1	75	86	11.3	9.3	11.2	1.4	121.3	15.1	8875	3
1972	8.1	75	91	11.9	9.3	11.4	1.5	122.7	15.9	9020	3
1973	8.1	75	92	12.6	9.3	11.9	1.6	128.0	16.8	9333	3
1974	8.2	75	96	13.3	9.1	12.0	1.6	130.7	17.7	9593	3
1975	8.2	75	98	14.1	9.1	10.7	1.7	117.3	18.8	9657	3
1976	8.2	66	88	14.7	8.0	11.5	1.8	142.4	22.3	9759	3
1977	8.3	68	94	NA	8.3	NA	NA	NA	NA	9368	3
1978	8.3	68	NA	NA	8.3	NA	NA	NA	NA	9575	3
FRANCE											
1969	50.4	570	g	65.6	11.3	9.4	1.3	83.5	11.5	5468	23
1970	50.8	570	476	68.0	11.2	9.8	1.3	87.5	11.9	5736	23
1971	51.3	565	499	71.0	11.0	10.1	1.4	92.0	12.6	5990	23
1972	51.7	560	520	74.6	10.8	10.3	1.4	95.5	13.3	6282	24
1973	52.2	560	535	73.6	10.7	10.7	1.4	99.8	13.1	6547	24
1974	52.5	580	559	77.1	11.0	11.4	1.5	103.1	13.3	6727	25
1975	52.7	575	596	77.9	10.9	11.3	1.5	103.7	13.5	6717	25
1976	52.9	585	596	NA	11.1	11.4	NA	103.1	NA	7006	26
1977	53.1	502	603	86.3	9.5	12.8	1.6	135.8	17.2	7196	28
1978	53.3	502	682	NA	9.4	NA	NA	NA	NA	7385	28
UNITED STATES											
1969	203.0	3460	2809	303.0	17.0	13.8	1.5	81.2	8.8	7512	651
1970	205.0	3070	2914	311.2	15.0	14.2	1.5	94.9	10.1	7428	586
1971	207.0	2720	2892	318.7	13.1	14.0	1.5	106.3	11.7	7580	531
1972	209.0	2320	2932	333.3	11.1	14.0	1.6	126.4	14.4	7938	524
1973	210.0	2250	2997	338.0	10.7	14.3	1.6	133.2	15.0	8336	498
1974	212.0	2170	3047	351.0	10.2	14.4	1.7	140.4	16.2	8170	494
1975	214.0	2130	3133	366.0	10.0	14.6	1.7	147.1	17.2	7997	473
1976	215.0	2100	3140	379.0	9.8	14.6	1.8	149.5	18.0	8412	447
1977	217.0	2100	3280	393.0	9.7	15.1	1.8	156.2	18.7	8737	465
1978	219.0	2286	3260	376.0	10.4	14.9	1.7	142.6	16.4	9002	460
SYRIA											
1969	6.1	75	g	1.5	12.3	6.6	0.2	53.3	2.0	598	
1970	6.3	75	40	1.6	11.9	6.5	0.3	54.7	2.1	592	
1971	6.5	110	41	1.7	16.9	7.1	0.3	41.8	1.5	628	
1972	6.7	115	46	1.9	17.2	7.8	0.3	45.2	1.7	679	
1973	6.9	115	52	2.4	16.7	8.0	0.3	47.8	2.1	673	
1974	7.2	130	55	2.7	18.1	8.2	0.4	45.4	2.1	764	
1975	7.4	230	59	2.4	31.1	8.6	0.3	27.8	1.0	840	
1976	7.7	230	64	NA	29.9	9.4	NA	31.3	NA	867	
1977	7.9	225	72	3.1	28.5	9.6	0.4	33.8	1.4	850	
1978	8.2	225	76	NA	27.4	NA	NA	NA	NA	851	

**TABLE III. Value of Arms Transfers and Total Imports and Exports, 1969-1978
By Region, Organization, and Country**

YEAR	ARMS IMPORTS		ARMS EXPORTS		TOTAL IMPORTS		TOTAL EXPORTS		ARMS IMPORTS	ARMS EXPORTS
	Billion dollars		Billion dollars		Billion dollars		Billion dollars		TOTAL IMPORTS	TOTAL EXPORTS
	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977	%	%
WORLD TOTALS										
1969	5860	9519	5860	9519	279	453	270	439	2.1	2.2
1970	5850	9036	5850	9036	321	496	310	479	1.8	1.9
1971	6370	9362	6370	9362	357	525	346	508	1.8	1.8
1972	10400	14680	10400	14680	422	596	412	581	2.4	2.6
1973	13200	17624	13200	17625	581	776	570	762	2.3	2.3
1974	11750	14334	11750	14334	838	1023	827	1010	1.4	1.4
1975	12600	14029	12600	14029	890	991	869	968	1.4	1.5
1976	16400	17352	16400	17352	1002	1060	985	1042	1.6	1.7
1977	19300	19300	19300	19300	1144	1144	1121	1121	1.7	1.7
1978	20600	19177	20600	19177	1330	1239	1302	1212	1.5	1.6
DEVELOPED										
1969	2000	3249	5690	9243	222	360	218	354	0.9	2.6
1970	1730	2672	5610	8665	256	395	251	387	0.7	2.2
1971	1670	2454	6095	8958	284	418	280	411	0.6	2.2
1972	3100	4375	9510	13423	338	477	332	469	0.9	2.9
1973	3420	4566	12880	17197	462	618	453	604	0.7	2.8
1974	3380	4123	11440	13956	647	790	598	730	0.5	1.9
1975	3510	3908	11970	13327	686	742	646	719	0.5	1.9
1976	4170	4412	15500	16400	761	805	715	756	0.5	2.2
1977	4115	4115	18550	18550	860	860	815	815	0.5	2.3
1978	3910	3640	19700	18339	999	930	972	904	0.4	2.0
DEVELOPING										
1969	3860	6270	170	276	57	93	52	84	6.8	0.3
1970	4120	6364	240	370	65	100	59	91	6.4	0.4
1971	4700	6907	275	404	73	107	65	96	6.4	0.4
1972	7300	10304	890	1256	84	119	79	111	8.6	1.2
1973	9780	13058	320	427	118	158	117	157	8.2	0.3
1974	8370	10210	310	378	190	232	229	280	4.4	0.1
1975	9090	10121	630	701	223	249	223	248	4.0	0.3
1976	12230	12940	900	952	240	254	270	285	5.1	0.3
1977	15185	15185	750	750	284	284	306	306	5.3	0.2
1978	16690	15537	900	837	331	308	330	307	5.0	0.3

TABLE III

TABLE III. Value of Arms Transfers and Total Imports and Exports, 1969-1978.
By Region, Organization, and Country - continued

YEAR	ARMS IMPORTS		ARMS EXPORTS		TOTAL IMPORTS		TOTAL EXPORTS		ARMS IMPORTS TOTAL	ARMS EXPORTS TOTAL
	Million dollars		Million dollars		Million dollars		Million dollars		1	2
	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977		
ISRAEL										
1969	160	259	5	8	1670	2712	729	1184	9.5	0.7
1970	230	355	5	7	2090	3228	779	1203	11.0	0.6
1971	260	382	0	0	2390	3512	958	1408	10.8	0.0
1972	270	381	10	14	2480	3500	1150	1623	10.8	0.9
1973	230	307	20	26	4240	5661	1449	1934	5.4	1.4
1974	975	1189	30	36	5440	6636	1825	2226	17.9	1.6
1975	750	835	50	55	6000	6680	1940	2160	12.5	2.6
1976	1000	1058	140	148	5667	5996	2420	2560	17.6	5.8
1977	1100	1100	60	60	5787	5787	3084	3084	19.0	1.9
1978	950	884	100	93	7403	6891	3921	3650	12.8	2.6
SWEDEN										
1969	10	16	0	0	5910	9600	5700	9259	0.1	0.0
1970	10	15	10	15	7010	10828	6800	10503	0.1	0.1
1971	5	7	50	73	7080	10405	7480	10993	0.0	0.7
1972	20	28	50	70	8110	11447	8770	12379	0.2	0.6
1973	20	26	10	13	10900	14553	12200	16289	0.1	0.1
1974	20	24	70	85	16700	20372	15900	19396	0.1	0.4
1975	20	22	90	100	17500	19485	17384	19356	0.1	0.5
1976	30	31	40	42	19628	20767	18435	19505	0.1	0.2
1977	40	40	50	50	20140	20140	19082	19082	0.1	0.3
1978	30	27	100	93	20535	19117	21806	20300	0.1	0.5
FRANCE										
1969	20	32	220	357	17400	28266	15200	24692	0.1	1.4
1970	10	15	200	308	19100	29503	18100	27958	0.0	1.1
1971	10	14	150	220	21300	31305	20800	30570	0.0	0.7
1972	20	28	725	1023	27000	38112	26500	37406	0.0	2.7
1973	20	26	850	1134	37700	50337	36700	49002	0.0	2.3
1974	20	24	700	853	52900	64534	46300	56482	0.0	1.5
1975	30	33	700	779	54000	60125	53100	59123	0.0	1.3
1976	50	52	1000	1058	64400	68139	57200	60521	0.0	1.7
1977	50	50	1300	1300	70497	70497	64997	64997	0.0	2.0
1978	40	37	1350	1256	81795	76147	79378	73897	0.0	1.7

TABLE III. Value of Arms Transfers and Total Imports and Exports, 1969-1978,
By Region, Organization, and Country - continued

YEAR	ARMS IMPORTS		ARMS EXPORTS		TOTAL IMPORTS		TOTAL EXPORTS		ARMS IMPORTS TOTAL IMPORTS	ARMS EXPORTS TOTAL EXPORTS
	Million dollars		Million dollars		Million dollars		Million dollars		%	%
	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977	Current	Constant 1977		
UNITED STATES										
1969	220	357	3500	5685	38300	62217	38000	61730	0.5	9.2
1970	190	293	3100	4788	42400	65494	43200	66730	0.4	7.2
1971	150	220	3400	4997	48300	70988	44100	64815	0.3	7.7
1972	160	225	4100	5787	58900	83140	49800	70295	0.2	8.2
1973	170	226	4900	6542	73600	98272	71300	95201	0.2	6.9
1974	120	146	4500	5489	108000	131752	98500	120163	0.1	4.6
1975	140	155	4700	5233	103000	114684	108000	120251	0.1	4.4
1976	110	116	5900	6242	130000	137549	114992	121670	0.0	5.1
1977	120	120	6900	6900	157560	157560	121212	121212	0.0	5.7
1978	120	111	6700	6237	183137	170492	143659	133739	0.0	4.7
BRAZIL										
1969	50	81	0	0	2270	3687	2310	3752	2.2	0.0
1970	20	30	0	0	2850	4402	2740	4232	0.7	0.0
1971	50	73	0	0	3700	5438	2900	4262	1.3	0.0
1972	60	84	0	0	4780	6747	3990	5632	1.2	0.0
1973	120	160	0	0	7000	9346	6200	8278	1.7	0.0
1974	60	73	0	0	14200	17323	7950	9696	0.4	0.0
1975	100	111	30	33	13592	15133	8670	9653	0.7	0.2
1976	180	190	80	84	13726	14523	10128	10716	1.3	0.6
1977	140	140	20	20	13257	13257	12120	12120	1.0	0.2
1978	160	148	90	83	15054	14014	12651	11777	1.0	0.7
SYRIA										
1969	50	81	0	0	370	601	207	336	13.5	0.0
1970	60	92	0	0	361	557	203	313	16.6	0.0
1971	110	161	0	0	439	645	207	304	25.0	0.0
1972	280	395	0	0	540	762	298	420	51.8	0.0
1973	1300	1735	0	0	613	818	351	468	212.0	0.0
1974	825	1006	0	0	1230	1500	784	956	67.0	0.0
1975	380	423	5	5	1690	1881	930	1035	22.4	0.5
1976	525	555	0	0	2360	2497	1065	1126	22.2	0.0
1977	775	775	0	0	2658	2658	1063	1063	29.1	0.0
1978	825	768	0	0	2451	2281	1053	980	33.6	0.0

APPENDIX B

U.S. Security Assistance to Israel
(all tables are partial)

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ISRAEL

SUMMARY OF FY 1981 SECURITY ASSISTANCE PROGRAMS (Dollars in Thousands)

Foreign Military Sales Financing Program	1,200,000
Military Assistance Program	-
International Military Education and Training Program	785,000
Economic Support Fund	-
Total	1,985,000

FMS FINANCING PROGRAM (Dollars in Thousands)

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
Direct Credit	500,000	500,000	500,000
Guaranteed Loans	2,200,000	50,000	200,000
Total	2,700,000	550,000	700,000
Status as of September 1979			
Principal Amount of FMS Financing Issued	7,154,244		
Principal Amount of FMS Financing Expended	4,949,450		
Principal Amount of FMS Financing Unexpended	2,204,794		
Principal Amount Repaid to Date	1,052,371		
Interest Paid to Date	702,413		
Committed Repayment Schedule Estimated as of 30 September 1979			
	Principal	Interest	Total
FY 1980	187,663	324,444	512,107
FY 1981	176,663	364,083	540,746
FY 1982	144,913	404,420	549,333
FY 1983	121,163	446,090	567,253
FY 1984	100,163	436,853	537,016
FY 1985	95,158	431,202	526,360
FY 1986	82,935	427,890	510,825
FY 1987	125,290	422,961	548,251
FY 1988	161,875	415,253	577,128
FY 1989	239,924	404,385	644,309

a/ An additional \$5,950,000 FMS financing was extended for which no repayments are required.

MILITARY AIR BASE CONSTRUCTION (Dollars in Thousands)

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
Total Obligational Authority a/	600,000	235,000	-

a/ This program provides the Government of Israel with two air bases in the Negev to replace air bases in the Sinai from which they are withdrawing as part of the peace accord between Israel and Egypt. The Government is providing \$800,000 toward this project. An additional \$200,000 is provided by the Government of Israel. The project requires the placement of the eventual cost of this project at \$1,000,000. The other \$240,000, a total of \$235,000 has been provided as authorized contract authority to the U.S. Army Corps of Engineers who are constructing the air bases. The remaining \$4,444 was paid by Israel under FY case 15-155, and is not reflected in this account.

MILITARY AIR BASE CONSTRUCTION (Dollars in Thousands)

unexpended balance as of 30 September 1979

76,136

INTERNATIONAL MILITARY EDUCATION AND TRAINING PROGRAM

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
(Dollars in Thousands)			
Student Training			
Training Teams			
Training Aids			
Other Support			
Total			
(Number of Students)			
In United States			
Overseas			
Total			

ISRAEL

FOREIGN MILITARY SALES AGREEMENTS

(Dollars in Thousands)

	Actual FY 1979	Estimated	
		FY 1980	FY 1981
Total Foreign Military Sales	382,147	500,000	900,000
FMS Financing Applied	382,147	500,000	900,000

COMMERCIAL EXPORTS LICENSED UNDER ARMS EXPORT CONTROL ACT

(Dollars in Thousands)

	Actual FY 1979	Estimated	
		FY 1980	FY 1981
Exports	158,587	250,000	250,000

ECONOMIC SUPPORT FUNDS

(Dollars in Thousands)

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
Grants	525,000	525,000	525,000
Loans	260,000	260,000	260,000
Total	785,000	785,000	785,000

OVERSEAS MILITARY PROGRAM MANAGEMENT

(Dollars in Thousands)

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
Grants			
Loans			
Net Cost to Government			
Military			
Peace Corps			
P.L. 480			
International Narcotics Control			
Total			

ECONOMIC ASSISTANCE PROGRAM DATA*

(Dollars in Thousands)

	Actual FY 1979	Estimated FY 1980	Proposed FY 1981
Development Aid (AID)			
Peace Corps	5,400	1,000	
P.L. 480			
International Narcotics Control			
Total	5,400	1,000	

*Other than Economic Support Fund.

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FOREIGN MILITARY SALES AGREEMENTS

(Dollars in Thousands)

	FY 1955- FY 1959	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	FY 1976	FY 1977	FY 1978	FY 1979	FY 1955- FY 1979
Algeria	11 822 330	1 130 691	1 395 050	2 980 579	5 306 061	10 381 200	15 030 606	14 817 324	8 793 633	11 746 444	13 025 451	97 229 132
Argentina	1 304 412	141 150	144 942	304 781	296 205	310 938	667 836	1 710 433	1 265 427	1 720 976	1 925 515	9 792 323
Australia	320 734	53 366	56 604	114 841	18 999	25 568	166 333	546 317	125 566	338 189	131 650	2 398 135
Brazil	-	-	65	268	223	120	22	-	525	600	-	10
Canada	1 340	7	-	-	-	-	-	111	-	-	431	4 274
China	5 542	-	-	-	-	-	-	160	-	-	-	160
Indonesia	649	-	13	-	148	148	51 867	3 712	7 215	109 602	39 104	8 542
Japan	235 405	21 278	10 722	40 768	49 592	58 087	30 001	42 467	44 136	342 135	480 470	1 355 059
Korea	4 532	-	393	8 731	1 594	100 091	223 472	615 219	637 571	407 188	242 528	2 241 678
Malaysia	3 115	1 337	83	40 790	1 648	1 401	4 192	5 395	5 052	2 603	34 872	101 888
New Zealand	32 135	5 347	6 656	3 343	3 401	5 492	3 867	6 679	5 523	8 732	12 513	154 737
Philippines	5 775	352	1 107	468	1 159	4 151	31 912	36 145	68 106	31 532	15 709	196 915
Singapore	1 713	2 395	1 961	5 440	7 529	11 699	1 481	17 933	112 252	12 796	7 324	181 848
Taiwan	123 213	34 315	67 230	73 148	205 973	37 733	139 460	329 112	154 405	355 134	544 331	2 114 465
Thailand	5 061	21 151	11	16 984	4 720	16 444	15 230	107 184	105 068	112 465	416 584	820 981
Vietnam	6	-	-	2	1 155	4	-	-	-	-	-	1 167
Yemen	2 215 712	410 572	713 423	1 134 143	3 937 210	2 591 917	8 720 354	11 330 363	5 968 525	7 825 956	9 428 529	59 422 479
Yugoslavia	-	-	-	-	-	-	15	26	77	27	1	147
Algeria	302	-	326	46	-	1 941	3 136	63 475	1 671	937 136	623 067	1 630 923
Argentina	56 297	911	355 174	457 888	2 153 402	3 966 322	1 313 812	1 334	1 441	1 515	7 069	28 426
Australia	13 152	133 753	-	-	-	-	-	1 588 970	3 236 145	763 590	41 520	16 672 347
Brazil	534 750	153 138	302 712	600 923	165 744	2 455 583	830 383	990 306	437 068	1 762 118	942 147	9 074 824
Canada	2 217	25 226	16 252	13 277	6 140	64 544	79 125	374 508	197 249	77 717	89 581	381 927
China	2 57	1 150	387	242	5 155	31 693	365 294	207 765	27 436	32 946	11 780	726 854
France	23 420	5 282	632	2 672	136	9 811	240	251	-	28 198	22 437	70 411
Germany	-	2 437	2 259	7 490	2 534	8 192	287 253	105 610	37 259	7 457	1 923	29 595
India	-	-	11	-	60	1	-	-	-	-	-	488 842
Italy	-	-	-	-	-	-	1 610	223	832	-	-	72
Japan	6 572	1 141	23 005	3	17 167	10 096	37 297	98 812	144 200	39 341	9 920	2 715
South Korea	9 341	1 274	15 15	506 311	1 578 661	2 039 570	5 801 534	7 757 377	1 889 643	4 122 322	5 419 391	457 579
Philippines	4	-	-	-	-	-	-	-	-	-	-	38 790 668
Singapore	-	-	-	-	-	-	-	-	-	-	-	4
Taiwan	-	-	-	-	-	-	-	-	-	-	-	1
Thailand	-	-	-	-	2 137	730	383	2 252	42 705	2 157	33 120	86 369
Vietnam	-	-	-	-	-	2 500	-	2 176	268	37	2 347	5 329
Yemen	-	-	-	-	-	-	372	130 263	2 530	1 293	181 256	318 241
Yugoslavia	-	-	-	-	-	-	-	-	-	-	-	-
Algeria	7 450 624	11 12	450 613	1 029 320	473 545	1 242 453	6 206 253	1 402 232	1 269 125	1 758 789	2 131 482	24 357 753
Argentina	3 42	23	2 000	1 814	3 433	3 660	7 637	9 356	7 206	3 487	52 963	167 450
Australia	2	15	2	513	307	13 416	1 575 685	7 747	6 477	12 779	19 382	1 770 245
Brazil	-	-	46 15	34 606	28 104	101 940	99 163	54 730	63 554	99 860	69 713	1 526 711
Canada	-	9 52	15 21	11 747	11 742	19 731	427 132	25 306	15 730	22 962	37 942	1 067 823

FOREIGN MILITARY SALES DELIVERIES

(Dollars in Thousands)

	FY 1955- FY 1969	FY 1970	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	FY 1976 a/	FY 1977	FY 1978	FY 1979	FY 1955- FY 1979
WORLDWIDE	7 859 601	1 342 252	1 371 634	1 460 148	1 512 740	3 184 529	3 533 230	5 860 735	7 074 703	7 732 061	7 399 372	48 331 207
Algeria	548 450	121 016	119 547	135 433	199 676	354 577	300 110	419 773	464 759	642 321	1 556 472	4 956 628
Australia	545 026	52 451	62 256	38 982	101 702	195 293	21 903	14 872	28 968	151 762	150 021	1 390 216
Bahrain	1 426	296	94	333	149	199	88	32	60	829	362	1 151
Canada	8 542	-	-	-	-	-	-	41	21	1	-	8 633
Indonesia	155 762	17	32 561	37 415	19 560	146	8 152	11 342	25 376	6 333	6 321	8 542
Japan	155 762	19 364	32 561	37 415	19 560	25 690	24 689	29 061	26 439	41 657	43 317	52 450
Malaysia	3 945	1 904	408	371	2 378	13 312	70 893	160 632	177 831	414 098	417 628	1 261 514
New Zealand	5 339	1 740	514	514	334	2 132	29 007	13 057	2 263	3 395	3 46	65 545
Philippines	5 316	5 472	24 222	6 330	3 337	12 366	2 949	1 986	3 239	4 266	5 967	126 504
Singapore	5 316	5 472	24 222	6 330	3 337	12 366	2 949	1 986	3 239	4 266	5 967	126 504
Taiwan	792	641	1 309	728	84	1 680	5 366	19 145	32 252	34 623	26 677	128 022
Thailand	30 031	1 094	955	2 382	1 622	3 737	7 734	7 132	15 177	9 765	82 202	132 618
United Arab Emirates	1 544	35 277	34 745	35 347	66 264	93 464	119 624	135 614	139 421	129 994	251 273	1 021 063
United Kingdom	1 544	5	12 463	13 010	3 459	1 156	5 720	26 824	17 711	95 266	65 515	275 376
United States	483 259	522 970	477 543	522 970	676 170	1 994 413	2 110 484	3 811 326	5 156 015	5 666 634	4 613 517	26 362 476
France	355	-	-	-	-	-	-	63	10 469	50 794	250 528	222 212
Germany	56 741	1 931	1 072	254	77	61	2 370	3 134	1 410	1 163	1 275	69 517
Italy	237 756	127 717	75 566	214 867	245 253	648 631	1 006 131	1 924 884	2 424 669	1 907 362	924 531	9 740 337
Israel	159 798	215 864	303 195	192 194	197 903	982 254	728 757	827 056	460 208	864 480	415 535	5 747 243
Japan	74 716	53 775	14 445	10 579	15 226	14 629	16 636	72 465	103 946	108 397	117 807	662 343
South Korea	1 901	1 044	1 122	38	1 791	844	7 545	16 937	157 790	190 731	96 272	469 299
Spain	17 376	6 167	1 459	3 527	891	270	48	16 937	361	8 363	5 277	26 276
Sweden	5 276	31 293	7 304	1 656	1 916	4 036	2 442	4 574	-	-	-	29 594
Switzerland	-	-	6	3	25	36	3	15 572	31 790	97 389	153 050	307 121
Taiwan	-	-	-	-	-	-	-	-	-	-	-	72
United Arab Emirates	56 609	20 342	6 067	1 262	3 845	11 675	12 965	15 311	33 438	46 662	67 156	275 454
United States	190 429	31 937	64 049	159 646	211 159	331 667	329 037	929 832	1 501 535	2 369 175	2 521 110	8 639 515
United Kingdom	2	-	2	-	-	-	-	-	-	-	-	4
France	2 600	36	-	4	43	237	206	635	3 241	1 559	42 039	50 802
Germany	-	-	-	-	-	-	-	-	255	2 197	242	2 694
Italy	-	-	-	-	-	-	1 809	313	20 860	27 261	74 562	124 825
Japan	5 625 549	678 881	666 405	676 994	554 287	745 025	961 395	1 422 523	1 161 398	967 448	1 569 784	15 109 690
South Korea	42 144	2 733	522	2 664	1 638	1 767	2 049	4 312	28 195	1 953	4 130	98 307
Spain	95 501	7 929	5 330	7 414	11 663	4 577	5 597	7 554	5 780	27 849	147 604	330 696
Sweden	715 951	39 482	33 622	48 781	39 951	52 081	76 611	98 154	66 169	73 557	76 863	1 341 228

Experiments in the

82

COMMERCIAL EXPORTS LICENSED UNDER ARMS EXPORT CONTROL ACT

(Dollars in Thousands)

	DATA NOT AVAILABLE PRIOR TO FY 1971	FY 1971	FY 1972	FY 1973	FY 1974	FY 1975	FY 1976 A/	FY 1977	FY 1978	Preliminary FY 1979	FY 1971- FY 1979
WORLDWIDE		427 545	480 625	362 076	502 166	546 551	1 401 999	1 523 403	1 676 007	1 388 977	8 288 346
EAST ASIA & PACIFIC		81 087	87 316	60 995	92 738	102 493	276 375	321 567	405 689	383 663	1 811 933
Australia		3 973	13 368	5 916	5 640	3 161	8 490	11 012	29 305	34 683	120 549
Brunei		100	14	11	58	25	39	234	886	1 029	2 396
Burma		193	146	108	29	47	157	26	632	7 986	9 324
China		-	4	-	-	-	-	1 023	-	-	1 027
India		-	2	-	-	-	-	-	-	-	4
French Polynesia (FP)		-	1	-	1	54	1	2	10	291	361
Niue Island		-	-	-	-	-	-	-	-	-	2
Hong Kong (UK)		215	452	358	128	416	1 305	3 801	12 167	15 573	34 417
Indonesia		414	638	68	859	304	6 707	5 295	3 011	16 832	34 129
Japan		54 947	54 270	39 725	58 644	35 083	151 426	102 823	123 178	179 584	799 680
Kampuchea		1	2	2	-	-	-	-	-	-	5
Korea		69	685	187	1 090	3 550	19 909	77 169	74 714	49 463	226 836
Laos		1	1	1	-	-	-	-	-	-	4
Macao (PORT)		2	1	3	2	3	1	23	3	55	134
Malaysia		3 223	3 429	2 461	10 583	3 359	6 334	41 500	63 150	17 558	151 596
Nauru		9	1	-	-	-	-	-	-	-	10
New Caledonia (FP)		23	9	19	42	42	94	74	103	59	467
New Hebrides (FP)		2	-	-	-	3	-	2	-	-	9
New Zealand		362	300	592	571	1 183	2 194	3 516	4 433	2 431	15 582
Norfolk Island, AUSTR		-	-	-	-	-	-	-	-	-	-
Papua New Guinea		6	5	-	1	2	81	188	39	187	508
Philippines		596	290	187	1 966	2 942	11 768	14 082	7 184	5 218	44 234
Pitcairn, UK		-	-	-	-	-	-	-	-	-	-
Singapore		1 353	4 661	4 033	723	5 041	15 297	6 652	4 494	7 970	50 223
Solomon Islands		-	-	-	-	-	-	-	-	-	-
Taiwan		3 397	5 697	6 001	8 086	44 982	42 531	46 140	73 637	39 588	275 960
Taiwan		1 278	3 308	1 319	4 315	2 294	10 040	8 005	8 677	5 067	44 304
Taiwan		33	30	3	-	-	-	-	-	-	66
Taiwan		1	1	-	-	-	-	-	-	-	2
Western Samoa		-	-	-	-	-	-	-	-	-	-
WEST ASIA & NORTH AFRICA		90 248	165 644	51 478	107 980	122 417	415 039	451 748	478 496	316 889	2 199 938
Algeria		-	-	6	-	-	75	132	3	100	316
Liberia		-	-	-	-	-	1 554	187	5	122	1 869
Libya		22	3	3	58	43	369	686	126	693	2 003
Barbados		-	-	80	37	-	33	808	32	16	1 008
Barbados		1	-	-	-	32	619	1 266	6 628	806	9 352
Barbados		2 277	3 591	22	659	219	6 169	9 132	9 456	9 670	41 194
Barbados		25 304	42 415	19 466	35 322	49 410	107 943	138 432	132 651	82 248	636 182
Barbados		-	-	-	-	-	29	63	139	9	240
Barbados		37 236	85 862	21 558	50 118	46 746	190 021	221 629	122 982	158 587	934 748
Barbados		24	57	17	92	184	148	3 708	9 337	3 707	17 275
Barbados		2	-	5	106	241	5 714	198	2 132	3 283	11 681
Barbados		12	1	3 044	575	502	301	2	2 095	1 535	8 590

APPENDIX C

Data About Defense Expenditures and Debt Payments in Israel

1. Government Expenditures as Percentage of the State Budget -----	126
2. Government Expenditures as Percentage of GNP -----	128
3. Functional Sorting of the Government Expenditures -----	129
4. The Development of Debt Payments -----	129

Source: The Israeli State Budget Proposal for
FY 1981 [170]

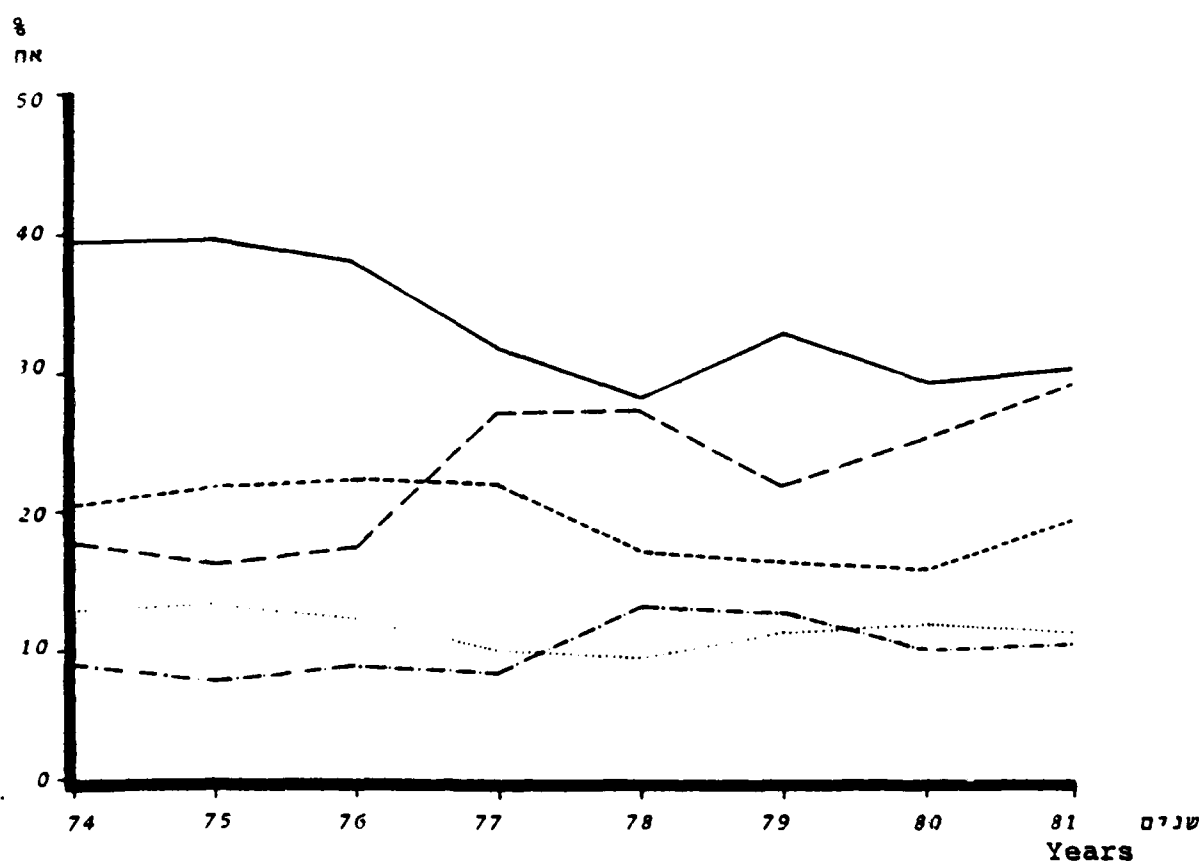
The graph displays the percentage of the population aged 15 and over with different levels of literacy from 1970 to 1981. The Y-axis represents the percentage, ranging from 0 to 30. The X-axis represents the years from 1970 to 1981. The four data series are: Total Literacy (solid line), Basic Literacy (dashed line), Functional Literacy (dotted line), and Illiterates (dash-dot line). Total Literacy shows the highest values, peaking at approximately 28% in 1978. Basic Literacy follows a similar pattern, peaking at about 10% in 1978. Functional Literacy shows a steady increase, peaking at about 12% in 1978. Illiterates show a general decline, starting at about 5% in 1970 and ending at about 2% in 1981.

Year	Total Literacy (%)	Basic Literacy (%)	Functional Literacy (%)	Illiterates (%)
70	4.8	2.5	5.2	5.0
71	5.0	4.2	4.8	4.8
72	10.2	4.8	6.5	3.5
73	5.5	4.8	7.2	2.8
74	7.5	4.0	8.8	1.2
75	6.5	3.8	1.2	1.2
76	8.8	3.8	4.2	0.8
77	15.2	10.2	10.2	0.2
78	28.2	10.2	12.2	0.2
79	11.8	3.8	7.8	2.2
80	16.2	7.8	9.2	1.2
81	15.2	2.8	11.2	1.8

Total debt payments as % of budget	סה"כ תשלום חובות כ-1 מהתקציב	_____
" " " " " sources	מהמקורות	" " " " " _____
External debt payments as % of exports]	תשלום מילווות חוץ	_____
Internal debt payments as % of national income	מיצוא סחורות ושירותים	_____
	מההכנסה הלאומית	_____

ההוצאה לפי הסיווג הכלכלי כאחוז מהתקציב בשנים 1974 - 1981

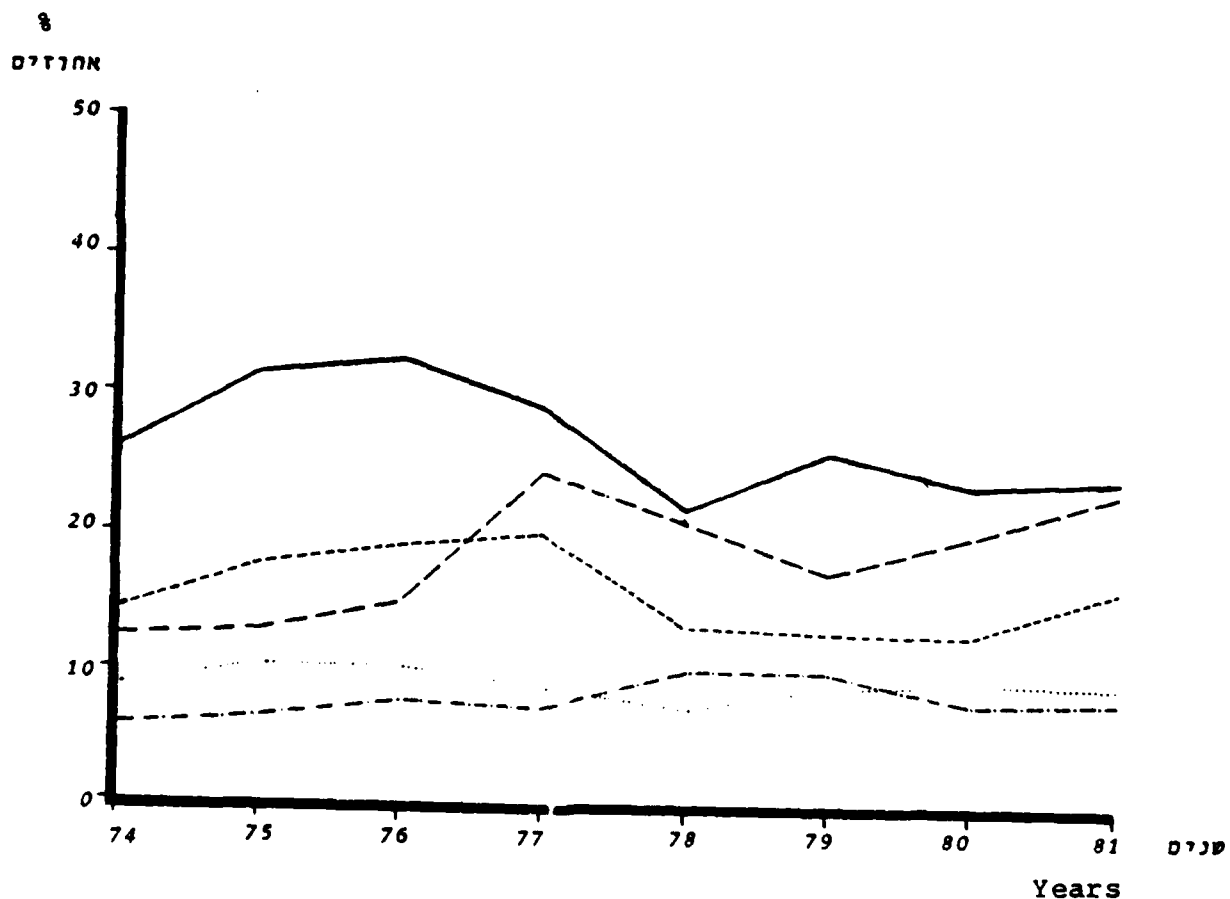
Government Expenditures as Percentage of the State Budget in the Years 1974-1981



defense	ביטחון	—————
debt payment and credit subsidies	תשלום חובות וסיבסוד	- - - - -
transfer payments	תשלומי העברה
investments and capital expenditures	השקעות והוצאות הון	- . - . -
civilian consumption	צריכה אזרחית	- - - - -

ההוצאה לפי הסיווג הכלכלי כאחוז מהתל"ג בשנים 1974-1981

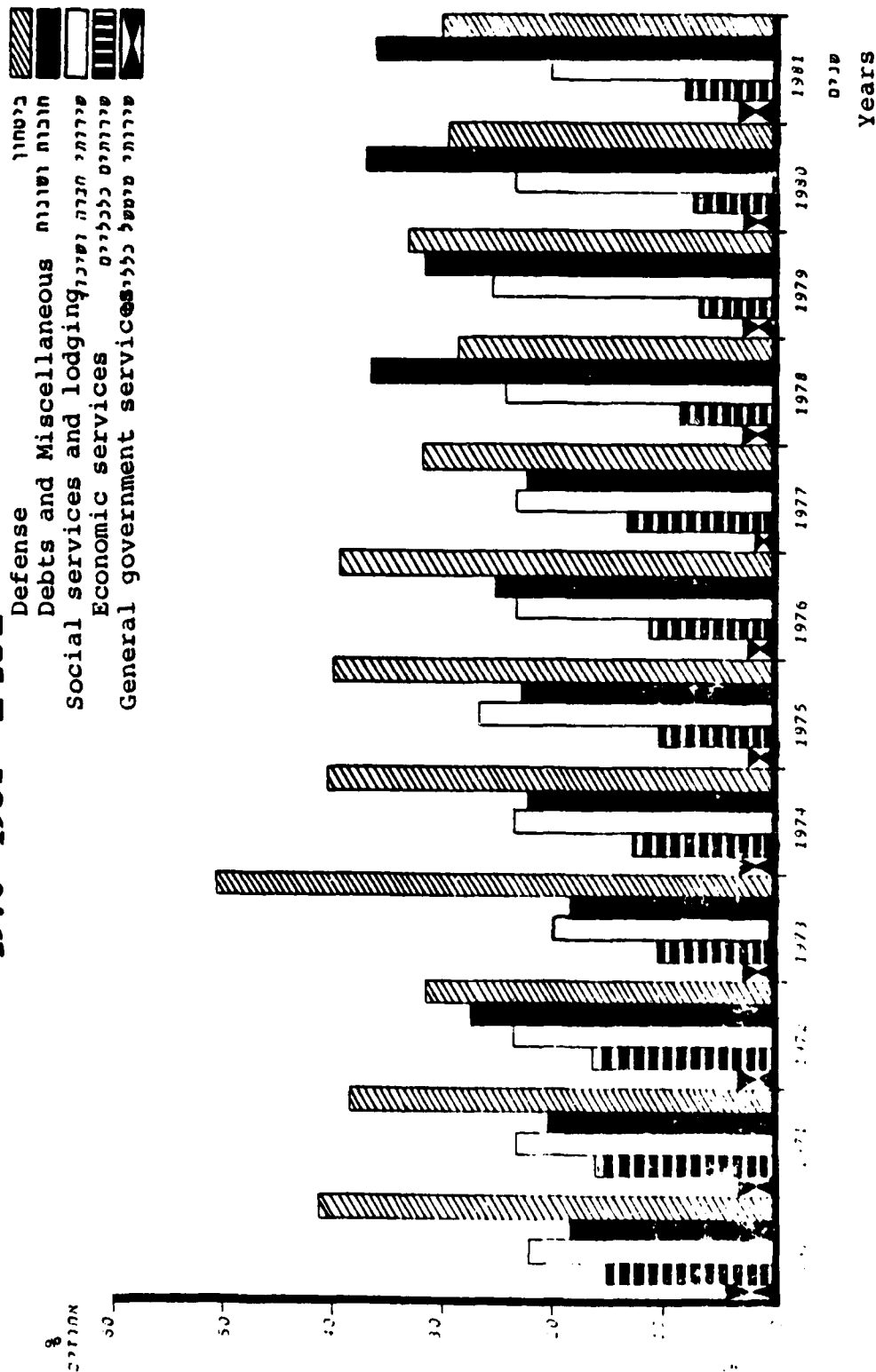
Government Expenditures as Percentage of the GNP
in the FYs 1974-1981



defense	ביטחון	—
debt payment and credit subsidizing	תשלום חובות וסיבסוד אשראי	- - -
transfer payments	תשלומי העברה	- · - · -
investments and capital expenditures	השקעות והוצאות הון
civilian consumption	צריכה אזרחית	- · - · -

Functional Sorting of the Government Expenditures in the
Years 1970-1981

מיון פונקציונלי של הוצאות הממשלה בשנים 1970-1981



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